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**PATENT**  
**Attorney Docket No.: SP01-095**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor: Bradford Giles Ackerman, et al.

Serial No: 09/844,947

Filing Date: April 27, 2001

Title: METHOD FOR PRODUCING  
TITANIA-DOPED FUSED  
SILICA GLASS

Examiner: John Hoffmann

Group Art Unit: 1336

Mail Stop Appeal Brief-Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Thank you for your communication of January 13, 2006 regarding the above referenced application. The following documents are enclosed with this cover letter.

1. A Revised Brief with three (3) Appendices titled:
  - (a) CLAIM APPENDIX TO BRIEF ON APPEAL;
  - (b) EVIDENCE APPENDIX; and
  - (c) RELATED PROCEEDINGS APPENDIX.
2. U.S. Patents
  - 5,152,819 to Blackwell et al
  - 4,419,116 to Nakahara et al.
  - 5,425,795 to Koide et al.
  - 5,423,898 to Terashima et al.
  - 6,672,110 to Roba et al

**BEST AVAILABLE COPY**

3. Case law cited

In re Vaeck, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991)

In re Fritch, 23 U.S.P.Q.2d 1780, 1783-84 (Fed. Cir. 1992)

In re Fine, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988)

In re Ehrreich, 200 U.S.P.Q. 504, 509-10 (C.C.P.A. 1979)

In re Oelrich, 198 U.S.P.Q. 210, 214 (C.C.P.A. 1978).

**Remarks**

Please note that Section VI, line 6, and Section VIII, lines 4 and 10 of the Brief were amended to include the Kiode et al U.S. Patent number which is No. 5,425,795.

The Brief has amended on page 10 by labeling the Appendix beginning thereon as the "CLAIM APPENDIX TO BRIEF ON APPEAL."

The Brief has been amended to include an "EVIDENCE APPENDIX." A copy of the patents and case law specified therein is enclosed with the Brief.

The Brief has been amended to include a "RELATED PROCEEDINGS APPENDIX." There are no related proceedings.

Prior amendments to the Brief described in applicants facsimile communications of November 4 and August 29, 2005 remain in the Brief.

Applicants believe that the enclosed Revised Brief overcomes all the objections raised by the Examiner in the January 13, 2006 Communication.

Respectfully submitted,

Dated: 3 February 2006

By: Walter M. Douglas

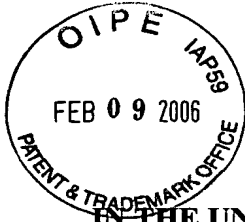
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Walter M. Douglas 3 Feb 2006  
Walter M. Douglas



**PATENT**  
**Attorney Docket No.: SP01-095**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor: Bradford Giles Ackerman, et al.

Serial No: 09/844947

Examiner: John Hoffmann

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Title: METHOD FOR PRODUCING  
TITANIA-DOPED FUSED  
SILICA GLASS

Mail Stop Appeal Brief-Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

**BRIEF ON APPEAL (3<sup>rd</sup> Revision)**

This Brief supports the appeal to the Board of Patent Appeals and Interferences from the final rejection dated March 29, 2005, in the application listed above. Applicant filed the Notice of Appeal on April 11, 2005, and now submits this Revised Appeal Brief pursuant to a communication from the Examiner dated January 13, 2006. Applicant also has previously filed the appropriate petition and paid the required fee to gain an extension of the due date for filing this Brief to the Board.

**I. REAL PARTY IN INTEREST**

The real party in interest in this appeal is Corning Incorporated.

## **II. RELATED APPEALS AND INTERFERENCES**

With respect to the appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal, there are no such appeals or interferences.

## **III. STATUS OF CLAIMS**

Claims 1, 2, 4-9, 13, 15, 20, 21, 23 and 24 were rejected in the Final Office Action dated January 25, 2005. These are the pending claims that are the subject of this Appeal and are set forth in the attached Appendix. Applicant had amended claim 1 after Final Rejection in an Amendment dated March 11, 2005 that was filed by facsimile transmission. *However, for purposes of this Appeal the Amendment filed March 11, 2005 should be considered as not having been made due to the Examiner's rejection of the Amendment and statement that further prosecution would require an additional search. The claims presented herein are those that existed at the time the Final Office Action was issued.*

## **IV. STATUS OF AMENDMENTS**

The Amendment after Final Rejection filed on March 11, 2005 *has not been entered*. By an Advisory Action dated March 29, 2005 that Examiner stated that the amendments are rejected on the grounds that (a) they raise new issues that would require further consideration and/or search, and (b) they are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal. The Examiner's Note states that the amendment to claim 1 is rejected because the subject matter is being claimed for the first time. *This, for purposes of this Appeal the Amendment filed March 11, 2005 should be considered as not having been made due to the Examiner's rejection of the Amendment and*

*statement that further prosecution would require an additional search. The claims presented herein are those that existed at the time the Final Office Action was issued*

**V. SUMMARY OF CLAIMED SUBJECT MATTER**

The claimed invention relates to a method for producing a fused silica glass containing titania (a SiO<sub>2</sub>-TiO<sub>2</sub> glass).

Claim 1, the only independent claim, relates to a method for making a fused silica glass. In the process particles of silica and titania are synthesized by delivering their respective precursors to a burner. Subsequently, a column of a solid porous preform is grown by successively depositing the particles on a deposition surface at a temperature below a minimum temperature at which the particles can consolidate either partially or fully into dense glass while successively translating the deposition surface away from the burner. Finally, in a separate step the porous preform is consolidated into a dense glass.

**VI. GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

The claims are currently rejected by the Patent office as follows:

Claims 1, 2, 4-9, 13, 15, 20, 21, 23 and 24 are rejected under 35 U.S.C. §103(a) as being unpatentable over Blackwell et al. (U.S. Patent No. 5,152,819) in view of Nakahara et al. (U. S. Patent No. 4,419,116), Koide et al. (U.S. Patent No. 5,425,795) or Terashima et al. (U. S. Patent No. 5,423,898) and Roba et al. (U.S. Patent No. 6,672,110).

## **VII. GROUPING OF CLAIMS**

In compliance with 37 C.F.R. § 1.192(c)(5), Applicant states that all of the claims do stand or fall together. Claim 1 is the independent claim and claims 2, 4-9, 13, 15, 20, 21, 23 and 24 depend on claim 1 either directly or indirectly through another dependent claim.

## **VIII. ARGUMENTS**

The rejection of Claims 1, 2, 4-9, 13, 15, 20, 21, 23 and 24 as being unpatentable under 35 U.S.C. §103(a) as being unpatentable over Blackwell et al. (U.S. Patent No. 5,152,819) in view of Nakahara et al. (U. S. Patent No. 4,419,116), Koide et al. (U.S. Patent No. 5,425,795) or Terashima et al. (U. S. Patent No. 5,423,898) and Roba et al. (U.S. Patent No. 6,672,110) is improper.

In the final Office Action of January 25, 22005, the Examiner rejected pending claims 1, 2, 4-9, 13, 15, 20, 21, 23 and 24 under 35 U.S.C. § 103(a) as being unpatentable over Blackwell et al. (U.S. Patent No. 5,152,819) in view of Nakahara et al. (U. S. Patent No. 4,419,116), Koide et al. (U.S. Patent No. 5,425,795) or Terashima et al. (U. S. Patent No. 5,423,898) and Roba et al (U.S. Patent No.6,67210). On page 2 of the Final Office Action, the Examiner stated that:

“Blackwell et al discloses a process for making an optical fiber glass preform. Silica precursor is mixed with a metal oxide dopant precursor, Ti oxide precursor and reacted in a soot burner to form soot. The soot is deposited on a rotating mandrel and subsequently consolidated in a He and Cl atmosphere. Blackwell is silent as to the minimum temperature of the soot deposition and the translation motion of the mandrel. Inherently the temperature during soot deposition is below the temperature at which the soot particles consolidate otherwise there would be solid fused glass instead of a soot preform. In any case, Roba et al teaches it is advantageous that the temperature of the soot preform during soot deposition be a temperature between 700 and 1200 °C. Note that Roba et al includes Ti doped soot preform, penultimate paragraph, column 5. It is also noted that “successively translating the deposition surface away from the burner”, is an obvious conventional feature of devices used to form the soot preform and of which Koide et al, Nakahara et al or Terashima et al are cited as evidence.”

Applicant respectfully submits that the Examiner failed to provide a *prima facie* case of obviousness because one of ordinary skill in the art would not be motivated to use or modify the teaching of Blackwell et al. in view of Roba et al. and the other cited art to obtain Applicant's invention. In re Vaeck, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991).

"The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." In re Fritch, 23 U.S.P.Q.2d 1780, 1783-84 (Fed. Cir. 1992). The Examiner did not, and is unable, to point to any place in Blackwell et al., Roba et al., and other cited references where it suggests or provides a motive to modify the method described by Blackwell et al. to obtain the method described by Applicants. In particular, there is no specific teaching in any reference with regard depositing the soot on a "bait" or mandrel at a temperature below the consolidation temperature of the soot.

**First**, Blackwell et al. teach generating vapors and passing vapors through a burner flame to form a stream of volatile gases and finely-divided spherical particles of soot. Blackwell et al. teach collecting the soot on a mandrel or bait tube to form a porous preform. Blackwell et al. teach that the final product of soot collection, the porous preform, is then subjected to high temperature in which the preform consolidates into a nonporous monolithic glass body.

The Examiner admits that Blackwell et al. is silent as to the minimum temperature of the soot deposition. The Examiner has asserted that "inherently the temperature of soot deposition [in Blackwell et al.] is below the temperature at which the soot particles consolidate otherwise there would be solid fused glass instead of a soot preform." However, the terms "soot preform" and/or "porous preform" is not sufficient to establish the temperature at which the particles of soot were deposited. For example, particles of soot that are only partially consolidated could be described as soot or porous preform. In fact,

Applicants submit that Blackwell et al. indicate that in the process they describe, which uses CVD (chemical vapor deposition) to form the soot preform, there is partial consolidation of the preform during the deposition process. Blackwell et al., column 9, line 67, to column 10, line 3, reads:

“The resulting soot is deposited on a rotating rod 9, thus forming a preform or blank 10 of silica soot. The preform is then heat treated in a consolidation furnace 11, in a He/Cl atmosphere to full consolidation.”

The statement that the preform is heated to “full consolidation” clearly indicates that there is partial consolidation during the deposition process.

In contrast to Blackwell et al., Applicants state in claim 1, lines 5-7, that the particles (soot) formed are deposited on “. . . a deposition surface at a temperature below a minimum temperature at which the particles can consolidate either partially or fully into dense glass . . .” Thus, Applicants specifically teach that the preform is formed at a temperature at which there is no consolidation (partial or full) of the deposited particles [soot] into a glass.

**Second**, The Examiner combines Blackwell et al. with Roba et al., citing Roba et al. as teaching that it is advantageous that the temperature of the soot preform during soot deposition be a temperature between 700 and 1200 °C. Applicants submit that this combination does not render their invention unpatentable for being obvious over the combination of Blackwell et al. and Roba et al.

The method described by Roba et al. is completely different from the process of the present invention. In particular, the method of Roba et al. is a flame-free method that requires water as a reactant. Referring to Roba et al., Summary of the Invention:

(a) in column 2, lines 40-42, the method is described as being “. . . a hydrolysis reaction for producing an optical perform. . .”; and



- (b) in column 2, lines 46-48, the hydrolysis reaction is described as being “. . . a flame-free hydrolysis, i.e., a reaction in which the process temperature can be precisely controlled, as opposed to convention flam-hydrolysis . . .”; and
- (c) in column 2, lines 60-61, the method is stated as comprising one requiring a “. . . first gaseous or vapor phase composition disposed to provide a hydrolyzable glass precursor . . .”, and in column 2, lines 63-64, “supplying water as a second gaseous or vapor phase composition . . .”

Applicants submit that this method is completely different from the methods described by Applicants in their specification. Applicants further submit that the 700-1200 °C temperature range described by Roba et al. and cited by the Examiner is peculiar to the method they claim and is the result of a temperature gradient that they provide within the reaction chamber as described in column 3, lines 5-8, “. . .characterized in that a temperature gradient is provided inside of said [reaction] chamber, said temperature gradient being such that the temperature increases from said inlet zone to said outlet of the reaction chamber.” Referring to Roba et al. Figure 3, the gradient is believed provided by the element represented by numeral 30 (*which numeral is not mentioned in the specification*), which seems similar to the electrical resistance heater 37 described in column 7, lines 9-13.

**Third**, the Examiner cites Nakahara et al. (U. S. Patent No. 4,419,116), Koide et al. (U.S. Patent No. 5,425,795) or Terashima et al. (U. S. Patent No. 5,423,898) for teaching the “successive translating the deposition surface away from the burner.” Applicants have reviewed these patents and comment that while Terashima et al. do not teach either the formation of any preform nor rotation. Terashima et al. Nakahara et al. (U. S. Patent No. 4,419,116) and Koide et al. (U.S. Patent No. 5,425,795) do teach rotation of the bait rod during formation of the preform, the disclosure therein does not render Applicants’ method obvious when combined with Blackwell et al. and Roba et al. The fact that Tereshima et al.,

Nakahara et al. and Kiode et al. teach an element of the Applicants' invention is not sufficient to make it obvious when other elements of Applicants' invention such as depositing the soot below consolidation (partial or full) temperature is not disclosed in the other art with which Tereshima et al., Nakahara et al. and Kiode et al. are combined.

The U.S. Court of Appeals for the Federal Circuit has stated that the Examiner has the burden under 35 U.S.C. § 103 to establish a *prima facie* case of obviousness and in the case of combined references, the Examiner can satisfy this burden "only by showing some objective teaching in the prior art . . . would lead that individual to combine the relevant teachings of the references." In re Fine, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988).

Moreover, both the suggestion and the reasonable expectation of success must be found in the prior art, not in the applicant's disclosure. In re Vaeck, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991).

Cited references should not be considered in a vacuum, but against the background of the references as a whole. "The question in a §103 case is what the references would collectively suggest to one of ordinary skill in the art." In re Ehrreich, 200 U.S.P.Q. 504, 509-10 (C.C.P.A. 1979). If the collective references indicate that those skilled in the art would ignore statements as speculative, then those statements cannot be considered teachings for purposes of an obviousness rejection. Id.; In re Oelrich, 198 U.S.P.Q. 210, 214 (C.C.P.A. 1978). In the instant case, as discussed above, the primary reference of Blackwell et al. does not teach or suggest a critical feature of the claimed invention; namely, deposition of soot below consolidation temperature. This feature is not supplied by the secondary reference of Roba et al or the additional references of Nakahara et al., Koide et al. or Terashima et al.

Consequently, Applicants submit that not only did the Examiner fail to meet his burden of establishing a *prima facie* case because one of ordinary skill in the art would lack the motivation to modify Blackwell et al.; but he failed to meet that burden because one

skilled in the art would not find Applicants' method when Blackwell et al. is combined with Roba et al., Nakahara et al., Koide et al. and Terashima et al. Accordingly, one skilled in the art would not reasonably expect to successfully arrive at Applicant's claimed invention by combining the primary and secondary references.

## IX. CONCLUSION

In conclusion, Applicant requests a reversal of each of the grounds of rejection maintained by the Examiner.

Please charge the necessary fees of \$500 for filing the Brief on Appeal to our Deposit Account No. 03-3325. If there are any other fees due in connection with the filing of this Brief on Appeal, please charge the fees to our Deposit Account No. 03-3325. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

Dated: 3 February 2006

By: Walter M. Douglas

Walter M. Douglas  
Registration No. 34,510  
607-974-2431  
Corning Incorporated  
Patent Department  
SP-TI-03-01  
Corning, NY 14831

**CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8:**

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Date of Deposit

Walter M. Douglas 3 Feb 2006  
Walter M. Douglas



**CLAIMS APPENDIX TO BRIEF ON APPEAL**

The claims on appeal are as follows. Claim 1 is shown with the amendment submitted in response to the Final Office Action.

**Listing of Claims:**

1. (rejected) A method for producing a fused silica glass containing titania, comprising:  
synthesizing particles of silica and titania by delivering a mixture of silica precursor and a titania precursor to a burner;  
growing a column of solid porous preform by successively depositing the particles on a deposition surface at a temperature below a minimum temperature at which the particles can consolidate either partially or fully into dense glass while successively translating the deposition surface away from the burner; and  
subsequently consolidating the porous preform into dense glass.
2. (rejected) The method of claim 1, wherein a translation speed of the deposition surface is adjusted to maintain a substantially constant distance between an end portion of the porous preform remote from the deposition surface and the burner during deposition.
3. (previously cancelled)
4. (rejected) The method of claim 1, wherein consolidating the porous preform into dense glass comprises heating the porous preform to a temperature in a range from 1200 to 1900°C.

## Claims Appendix

5. (rejected) The method of claim 1, further comprising dehydrating the porous preform by exposing the porous preform to a heated, halide-containing atmosphere prior to consolidation.
6. (rejected) The method of claim 5, where in the heated, halide-containing atmosphere comprises chlorine.
7. (rejected) The method of claim 5, where in the heated, halide-containing atmosphere comprises fluorine.
8. (rejected) The method of claim 5, wherein the temperature of the heated, halide-containing atmosphere is in a range from 900 to 1100°C.
9. (rejected) The method of claim 1, wherein the glass contains 2 to 12% by weight titania.
10. – 12 (perviously cancelled)
13. (rejected) The method of claim 5, wherein a translation speed of the deposition surface is adjusted to maintain a substantially constant distance between an end portion of the porous preform remote from the deposition surface and the burner during deposition.
14. (perviously cancelled)
15. (rejected) The method of claim 5, wherein consolidating the porous preform into dense glass comprises heating the porous preform to a temperature in a range from 1200 to 1900°C.

## Claims Appendix

16. – 19. (perviously cancelled)

20. (rejected) The method of claim 1, wherein the minimum temperature is approximately 1200°C.

21. (rejected) The method of claim 20, wherein the temperature at which the particles are deposited is approximately 200 to 500°C less than the minimum temperature.

22. (previously cancelled)

23. (rejected) The method of claim 1, wherein a variation on coefficient of thermal expansion of the dense glass is in a range from -5 ppb/°C to +5 ppb/°C.

24. (rejected) The method of claim 1, further comprising rotating the deposition surface relative to the burner while successively depositing the particles on the deposition surface.

## **EVIDENCE APPENDIX**

### **1. Evidence**

U.S. Patent Nos.     5,152,819 to Blackwell et al  
  
                                 4,419,116 to Nakahara et al.  
  
                                 5,425,795 to Koide et al.  
  
                                 5,423,898 to Terashima et al.  
  
                                 6,672,110 to Roba et al

### **2. Location of Patent Evidence**

The Patent Evidence above was cited by the Examiner in the Final Rejection.

Copies of the Evidence are enclosed with this Brief.

### **3. Case Law (copies enclosed)**

In re Vaeck, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991)

In re Fritch, 23 U.S.P.Q.2d 1780, 1783-84 (Fed. Cir. 1992)

In re Fine, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988)

In re Ehrreich, 200 U.S.P.Q. 504, 509-10 (C.C.P.A. 1979)

In re Oelrich, 198 U.S.P.Q. 210, 214 (C.C.P.A. 1978).

Case law was cited by applicants in the Appeal Brief .

**RELATED PROCEEDINGS APPENDIX**

**NONE**



products so that they can be positioned to enter the general market at the end of the lives of relevant patents. At least for relatively small start-up companies like Ventritex, where much of the business and technical work essential to survival is done by a small group of people, the promise by Congress of a safe haven could prove to be completely illusory if the courts permitted competitors to proceed full bore with expensive, resource-draining, and personnel-distracting litigation in the form of actions for declaratory relief. It makes little sense, and thus we assume would be inconsistent with Congress' intent, to protect companies like Ventritex from suit for actual patent infringement but leave them fully exposed to declaratory relief actions whose gravamen and burdens are much the same. While the considerations discussed in the preceding paragraph are sufficient to support our decision not to exercise jurisdiction at this time over plaintiff's declaratory relief counts, the fact that these additional policy considerations cut in the same direction intensifies our resolve.

For all the reasons discussed in this section, we hereby GRANT defendants' motion to dismiss plaintiff's declaratory relief claims (Counts VIII and IX). Those Counts are ORDERED dismissed.

#### V. DEFENDANTS' MOTION TO DISMISS THE REMAINING STATE LAW CLAIMS (COUNTS X - XIX).

Defendants earlier moved this court to dismiss plaintiff's state law claims asserted in Counts X - XVII of plaintiff's original complaint. Defendants contended that, since the sole basis of subject matter jurisdiction over these claims was pendency to the federal question claims in Counts I - IX, the court should dismiss the state law claims if it grants defendants' motion to dismiss the federal law claims in counts I - IX.

However, plaintiff has since amended its complaint. The second amended complaint now alleges a separate basis for jurisdiction under 28 U.S.C. § 1332(a) (diversity). Plaintiff also has added two new counts, including an additional federal claim (Count XVIII — Correction of Inventorship) that is not disposed of by our ruling on the applicability of the 271(e)(1) defense. Thus, we hereby DENY defendants' motion to dismiss plaintiff's state law claims.

#### VI. CONCLUSION.

Given the dispositive effect of the 271(e)(1) defense on Counts I - IX of plaintiff's second amended complaint, this court finds that there is no just reason for delaying final judgment on those counts, despite the

remaining federal law count and the state law counts. Thus, we ORDER entry of summary judgment on Counts I - IX.  
IT IS SO ORDERED.

#### Court of Appeals, Federal Circuit

In re Vaeck

No. 91-1120

Decided October 21, 1991

#### PATENTS

##### 1. Patentability/Validity — Obviousness — Combining references (§115.0905)

Rejection of claimed subject matter as obvious under 35 USC 103 in view of combination of prior art references requires consideration of whether prior art would have suggested to those of ordinary skill in art that they should make claimed composition or device, or carry out claimed process, and whether prior art would also have revealed that such person would have reasonable expectation of success; both suggestion and reasonable expectation of success must be founded in prior art, not in applicant's disclosure.

##### 2. Patentability/Validity — Obviousness — Relevant prior art — Particular inventions (§115.0903.03)

Patent and Trademark Office has failed to establish prima facie obviousness of claims for use of genetic engineering techniques for producing proteins that are toxic to insects such as larvae of mosquitos and black flies, since prior art does not disclose or suggest expression in cyanobacteria of chimeric gene encoding insecticidally active protein, or convey to those of ordinary skill reasonable expectation of success in doing so; expression of antibiotic resistance-conferring genes in cyanobacteria, without more, does not render obvious expression of unrelated genes in cyanobacteria for unrelated purposes.

##### 3. Patentability/Validity — Specification — Enablement (§115.1105)

#### JUDICIAL PRACTICE AND PROCEDURE

##### Procedure — Judicial review — Standard of review — Patents (§410.4607.09)

Specification must, in order to be enabling as required by 35 USC 112, first paragraph, teach person skilled in art to make and use

remaining federal law count and the state law counts. Thus, we ORDER entry of summary judgment on Counts I - IX.  
IT IS SO ORDERED.

## Court of Appeals, Federal Circuit

In re Vaeck

No. 91-1120

Decided October 21, 1991

## PATENTS

### 1. Patentability/Validity — Obviousness — Combining references (§115.0905)

Rejection of claimed subject matter as obvious under 35 USC 103 in view of combination of prior art references requires consideration of whether prior art would have suggested to those of ordinary skill in art that they should make claimed composition or device, or carry out claimed process, and whether prior art would also have revealed that such person would have reasonable expectation of success; both suggestion and reasonable expectation of success must be founded in prior art, not in applicant's disclosure.

### 2. Patentability/Validity — Obviousness — Relevant prior art — Particular inventions (§115.0903.03)

Patent and Trademark Office has failed to establish prima facie obviousness of claims for use of genetic engineering techniques for producing proteins that are toxic to insects such as larvae of mosquitos and black flies, since prior art does not disclose or suggest expression in cyanobacteria of chimeric gene encoding insecticidally active protein, or convey to those of ordinary skill reasonable expectation of success in doing so; expression of antibiotic resistance-conferring genes in cyanobacteria, without more, does not render obvious expression of unrelated genes in cyanobacteria for unrelated purposes.

### 3. Patentability/Validity — Specification — Enablement (§115.1105)

## JUDICIAL PRACTICE AND PROCEDURE

### Procedure — Judicial review — Standard of review — Patents (§410.4607.09)

Specification must, in order to be enabling as required by 35 USC 112, first paragraph, teach person skilled in art to make and use

invention without "undue experimentation," which does not preclude some experimentation; enablement is question of law which is reviewed independently on appeal, although such determination is based upon underlying factual findings which are reviewed for clear error.

## PATENTS

### 4. Patentability/Validity — Specification — Enablement (§115.1105)

Patent and Trademark Office did not err in rejecting, as non-enabling pursuant to 35 USC 112, first paragraph, claims for use of genetic engineering techniques for producing proteins that are toxic to insects such as larvae of mosquitos and black flies, in view of relatively incomplete understanding of biology of cyanobacteria as of applicants' filing date, as well as limited disclosure by applicants of particular cyanobacterial genera operative in claimed invention, since there is no reasonable correlation between narrow disclosure in applicants' specification and broad scope of protection sought in claims encompassing gene expression in any and all cyanobacteria.

Appeal from the U.S. Patent and Trademark Office, Board of Patent Appeals and Interferences.

Application for patent, serial no. 07/021,405, filed March 4, 1987, by Mark A. Vaeck, Wipa Chungjatupornchai, and Lee McIntosh (hybrid genes incorporating a DNA fragment containing a gene coding for an insecticidal protein, plasmids, transformed cyanobacteria expressing such protein and method for use as a biocontrol agent). From decision rejecting claims 1-48 and 50-52 as unpatentable under 35 USC 103, and rejecting claims 1-48 and 50-51 for lack of enablement, applicants appeal. Affirmed and part reversed in part; Mayer, J., dissents with opinion.

Ian C. McLeod, Okemos, Mich., for appellant.

Teddy S. Gron, associate solicitor (Fred E. McKelvey, solicitor and Richard E. Schafer, associate solicitor, with him on brief), for appellee.

Before Rich, Archer, and Mayer, circuit judges.

Rich, J.

This appeal is from the September 12, 1990 decision of the Patent and Trademark Office (PTO) Board of Patent Appeals and Interferences (Board), affirming the examiner's rejection of claims 1-48 and 50-52 of application Serial No. 07/021,405, filed March 4, 1987, titled "Hybrid Genes Incorporating a DNA Fragment Containing a Gene Coding for an Insecticidal Protein, Plasmids, Transformed Cyanobacteria Expressing Such Protein and Method for Use as a Biocontrol Agent" as unpatentable under 35 USC 103, as well as the rejection of claims 1-48 and 50-51 under 35 USC 112, first paragraph, for lack of enablement. We reverse the § 103 rejection. The § 112 rejection is affirmed in part and reversed in part.

## BACKGROUND

### A. The Invention

The claimed invention is directed to the use of genetic engineering techniques<sup>1</sup> for production of proteins that are toxic to insects such as larvae of mosquitos and black flies. These swamp-dwelling pests are the source of numerous human health problems, including malaria. It is known that certain species of the naturally-occurring *Bacillus* genus of bacteria produce proteins ("endotoxins") that are toxic to these insects. Prior art methods of combatting the insects involved spreading or spraying crystalline spores of the insecticidal *Bacillus* proteins over swamps. The spores were environmentally unstable, however, and would often sink to the bottom of a swamp before being consumed, thus rendering this method prohibitively expensive. Hence the need for a lower-cost method of producing the insecticidal *Bacillus* proteins in high volume, with application in a more stable vehicle.

As described by appellants, the claimed subject matter meets this need by providing for the production of the insecticidal *Bacillus* proteins within host cyanobacteria. Although both cyanobacteria and bacteria are members of the procaryote<sup>2</sup> kingdom, the

<sup>1</sup> Basic vocabulary and techniques for gene cloning and expression have been described in *In re O'Farrell*, 853 F.2d 894, 895-99, 7 USPQ2d 1673, 1674-77 (Fed. Cir. 1988), and are not repeated here.

<sup>2</sup> All living cells can be classified into one of two broad groups, procaryotes and eucaryotes. The procaryotes comprise organisms formed of cells that do not have a distinct nucleus; their DNA floats throughout the cellular cytoplasm. In contrast, the cells of eucaryotic organisms such as man, other animals, plants, protozoa, algae and yeast have a distinct nucleus wherein their DNA resides.

cyanobacteria (which in the past have been referred to as "blue-green algae") are unique among procaryotes in that the cyanobacteria are capable of oxygenic photosynthesis. The cyanobacteria grow on top of swamps where they are consumed by mosquitos and black flies. Thus, when *Bacillus* proteins are produced within transformed<sup>3</sup> cyanobacterial hosts according to the claimed invention, the presence of the insecticide in the food of the targeted insects advantageously guarantees direct uptake by the insects.

More particularly, the subject matter of the application on appeal includes a chimeric (i.e., hybrid) gene comprising (1) a gene derived from a bacterium of the *Bacillus* genus whose product is an insecticidal protein, united with (2) a DNA promoter effective for expressing<sup>4</sup> the *Bacillus* gene in a host cyanobacterium, so as to produce the desired insecticidal protein.

The claims on appeal are 1-48 and 50-52, all claims remaining in the application. Claim 1 reads:

1. A chimeric gene capable of being expressed in Cyanobacteria cells comprising: (a) a DNA fragment comprising a promoter region which is effective for expression of a DNA fragment in a Cyanobacterium; and

(b) at least one DNA fragment coding for an insecticidally active protein produced by a *Bacillus* strain, or coding for an insecticidally active truncated form of the above protein or coding for a protein having substantial sequence homology to the active protein,

the DNA fragments being linked so that the gene is expressed.

Claims 2-15, which depend from claim 1, recite preferred *Bacillus* species, promoters, and selectable markers.<sup>5</sup> Independent claim 16 and claims 17-31 which depend therefrom are directed to a hybrid plasmid vector which

includes the chimeric gene of claim 1. Claim 32 recites a bacterial strain. Independent claim 33 and claims 34-48 which depend therefrom recite a cyanobacterium which expresses the chimeric gene of claim 1. Claims 50-51 recite an insecticidal composition. Claim 52 recites a particular plasmid that appellants have deposited.

### B. Appellants' Disclosure

In addition to describing the claimed invention in generic terms, appellants' specification discloses two particular species of *Bacillus* (*B. thuringiensis*, *B. sphaericus*) as sources of insecticidal protein; and nine genera of cyanobacteria (*Synechocystis*, *Anacystis*, *Synechococcus*, *Agmenellum*, *Aphanocapsa*, *Gloecapsa*, *Nostoc*, *Anabaena* and *Ffremyllia*) as useful hosts.

The working examples relevant to the claims on appeal detail the transformation of a single strain of cyanobacteria, i.e., *Synechocystis* 6803. In one example, *Synechocystis* 6803 cells are transformed with a plasmid comprising (1) a gene encoding a particular insecticidal protein ("B.t. 8") from *Bacillus thuringiensis* var. *israelensis*, linked to (2) a particular promoter, the P<sub>L</sub> promoter from the bacteriophage Lambda (a virus of *E. coli*). In another example, a different promoter, i.e., the *Synechocystis* 6803 promoter for the rubisco operon, is utilized instead of the Lambda P<sub>L</sub> promoter.

### C. The Prior Art

A total of eleven prior art references were cited and applied, in various combinations, against the claims on appeal.

The focus of Dzelzkalns,<sup>6</sup> the primary reference cited against all of the rejected claims, is to determine whether chloroplast promoter sequences can function in cyanobacteria. To that end Dzelzkalns discloses the expression in cyanobacteria of a chimeric gene comprising a chloroplast promoter sequence fused to a gene encoding the enzyme chloramphenicol acetyl transferase (CAT).<sup>7</sup> Importantly, Dzelzkalns teaches the use of the CAT gene as a "marker" gene; this use of antibiotic resistance-conferring genes for selection purposes is a common technique in genetic engineering.

<sup>6</sup> 12 *Nucleic Acids Res* 8917 (1984)

<sup>7</sup> Chloramphenicol is an antibiotic; CAT is an enzyme which destroys chloramphenicol and thus imparts resistance thereto

<sup>3</sup> "Transformed" cyanobacteria are those that have successfully taken up the foreign *Bacillus* DNA such that the DNA information has become a permanent part of the host cyanobacteria, to be replicated as new cyanobacteria are generated.

<sup>4</sup> "Expression" of a gene refers to the production of the protein which the gene encodes; more specifically, it is the process of transferring information from a gene (which consists of DNA) via messenger RNA to ribosomes where a specific protein is made.

<sup>5</sup> In the context of the claimed invention, "selectable markers" or "marker genes" refer to antibiotic-resistance conferring DNA fragments, attached to the gene being expressed, which facilitate the selection of successfully transformed cyanobacteria.

c gene of claim 1. Claim 1 is independent of claim 1. Claim 1 is 34-48 which depend on a cyanobacterium which encodes a gene of claim 1. an insecticidal composition comprising a particular plasmid deposited.

#### Disclosure

describing the claimed invertebrates, appellants' specific particular species of *Bacillus*, *B. sphaericus* as a particular protein; and nine genera (*Synechocystis*, *Anacystis*, *Agmenellum*, *Aphanizomenon*, *Nostoc*, *Anabaena* and other hosts).

Examples relevant to the tail of the transformation of cyanobacteria, i.e., *Synechocystis* transformed with a plasmid encoding a particular ("B.t. 8") from *Bacillus thuringiensis*, linked to (2) a  $P_L$  promoter from  $\lambda$  (a virus of *E. coli*). For example, a different promoter, is utilized instead of the  $P_L$  promoter.

prior art references were in various combinations, on appeal. Dzelzkalns,<sup>6</sup> the primary inventor, teaches that a chloroplast promoter gene encoding the enzyme of acetyl transferase. Dzelzkalns teaches a gene as a "marker" gene; antibiotic resistance-conferring purposes is a common genetic engineering.

Res. 8917 (1984). CAT is an antibiotic; CAT is an antibiotic and thus hereto.

Sekar I,<sup>8</sup> Sekar II,<sup>9</sup> and Ganesan<sup>10</sup> collectively disclose expression of genes encoding certain *Bacillus* insecticidal proteins in the bacterial hosts *B. megaterium*, *B. subtilis* and *E. coli*.

Friedberg<sup>11</sup> discloses the transformation of the cyanobacterium *Anacystis nidulans* R2 by a plasmid vector comprising the  $O_L P_L$  operator-promoter region and a temperature-sensitive repressor gene of the bacteriophage  $\lambda$ . While the cyanobacteria are attractive organisms for the cloning of genes involved in photosynthesis, Friedberg states, problems may still be encountered such as suboptimal expression of the cloned gene, detrimental effects on cell growth of overexpressed, highly hydrophobic proteins, and rapid turnover of some gene products. To address these problems, Friedberg teaches the use of the disclosed  $\lambda$  regulatory signals in plasmid vehicles which, it states, have "considerable potential for use as vectors the expression of which can be controlled in *Anacystis*..."

Miller<sup>12</sup> compares the initiation specificities *in vitro* of DNA-dependent RNA polymerases<sup>13</sup> purified from two different species of cyanobacteria (*Fremyella diplosiphon* and *Anacystis nidulans*), as well as from *E. coli*.

Nierzwicki-Bauer<sup>14</sup> identifies in the cyanobacterium *Anabaena* 7120 the start site for transcription of the gene encoding *rbcl*, the large subunit of the enzyme ribulose-1, 5-bisphosphate carboxylase. It reports that the nucleotide sequence 14-8 base pairs preceding the transcription start site "resembles a good *Escherichia coli* promoter," but that the sequence 35 base pairs before the start site does not.

Chauvat<sup>15</sup> discloses host-vector systems for gene cloning in the cyanobacterium *Synechocystis* 6803, in which the antibiotic resistance-conferring *neo* gene is utilized as a selectable marker.

<sup>6</sup> 137 *Biochem. and Biophys. Res. Comm.* 748 (1986).

<sup>8</sup> 33 *Gene* 151 (1985).

<sup>9</sup> 189 *Mol. Gen. Genet.* 181 (1983).

<sup>10</sup> 203 *Mol. Gen. Genet.* 505 (1986).

<sup>11</sup> 140 *J. Bacteriology* 246 (1979).

<sup>12</sup> RNA polymerase, the enzyme responsible for making RNA from DNA, binds at specific nucleotide sequences (promoters) in front of genes in DNA, and then moves through the gene making an RNA molecule that includes the information contained in the gene. Initiation specificity is the ability of the RNA polymerase to initiate this process specifically at a site(s) on the DNA template.

<sup>13</sup> 81 *Proc. Natl. Acad. Sci. USA* 5961 (1984).

<sup>14</sup> 204 *Mol. Gen. Genet.* 185 (1986).

Reiss<sup>16</sup> studies expression in *E. coli* of various proteins formed by fusion of certain foreign DNA sequences with the *neo* gene.

Kolowsky<sup>17</sup> discloses chimeric plasmids designed for transformation of the cyanobacterium *Synechococcus* R2, comprising an antibiotic-resistant gene linked to chromosomal DNA from the *Synechococcus* cyanobacterium.

Barnes, United States Patent No. 4,695,455, is directed to the treatment with stabilizing chemical reagents of pesticides produced by expression of heterologous genes (such as those encoding *Bacillus* proteins) in host microbial cells such as *Pseudomonas* bacteria. The host cells are killed by this treatment, but the resulting pesticidal compositions exhibit prolonged toxic activity when exposed to the environment of target pests.

#### D. The Grounds of Rejection

##### 1. The § 103 Rejections

Claims 1-6, 16-21, 33-38, 47-48 and 52 (which include all independent claims in the application) were rejected as unpatentable under 35 USC 103 based upon Dzelzkalns in view of Sekar I or Sekar II and Ganesan. The examiner stated that Dzelzkalns discloses a chimeric gene capable of being highly expressed in a cyanobacterium, said gene comprising a promoter region effective for expression in a cyanobacterium operably linked to a structural gene encoding CAT. The examiner acknowledged that the chimeric gene and transformed host of Dzelzkalns differ from the claimed invention in that the former's structural gene encodes CAT rather than insecticidally active protein. However, the examiner pointed out, Sekar I, Sekar II, and Ganesan teach genes encoding insecticidally active proteins produced by *Bacillus*, and the advantages of expressing such genes in heterologous<sup>18</sup> hosts to obtain larger quantities of the protein. The examiner contended that it would have been obvious to one of ordinary skill in the art to substitute the *Bacillus* genes taught by Sekar I, Sekar II, and Ganesan for the CAT gene in the vectors of Dzelzkalns in order to obtain high level expression of the *Bacillus* genes in the transformed cyanobacteria. The examiner further contended that it would have been obvious to use cyanobacteria as heterologous hosts for expression of the claimed genes due to the ability of cyanobacteria to serve as transformed hosts for the

<sup>16</sup> 30 *Gene* 211 (1984).

<sup>17</sup> 27 *Gene* 289 (1984).

<sup>18</sup> Denotes different species or organism.

expression of heterologous genes. In the absence of evidence to the contrary, the examiner contended, the invention as a whole was prima facie obvious.

Additional rejections were entered against various groups of dependent claims which we need not address here. All additional rejections were made in view of Dzelzkalns in combination with Sekar I, Sekar II, and Ganesan, and further in view of other references discussed in Part C above.

The Board affirmed the § 103 rejections, basically adopting the examiner's Answer as its opinion while adding a few comments. The legal conclusion of obviousness does not require absolute certainty, the Board added, but only a reasonable expectation of success, citing *In re O'Farrell*, 853 F.2d 894, 7 USPQ2d 1673 (Fed. Cir. 1988). In view of the disclosures of the prior art, the Board concluded, one of ordinary skill in the art would have been motivated by a reasonable expectation of success to make the substitution suggested by the examiner.

## 2. The § 112 Rejection

The examiner also rejected claims 1-48 and 50-51 under 35 USC 112, first paragraph, on the ground that the disclosure was enabling only for claims limited in accordance with the specification as filed. Citing *Manual of Patent Examining Procedure* (MPEP) provisions 706.03(n)<sup>19</sup> and (z)<sup>20</sup> as support, the examiner took the position that undue experimentation would be required of the art worker to practice the

<sup>19</sup> MPEP 706.03(n), "Correspondence of Claim and Disclosure," provides in part:

In chemical cases, a claim may be so broad as to not be supported by [the] disclosure, in which case it is rejected as unwarranted by the disclosure. . . .

<sup>20</sup> MPEP 796.03(z), "Undue Breadth," provides in part:

[I]n applications directed to intentions in arts where the results are unpredictable, the disclosure of a single species usually does not provide an adequate basis to support generic claims. *In re Sol*, 1938 C.D. 723; 497 O.G. 546. This is because in arts such as chemistry it is not obvious from the disclosure of one species, what other species will work. *In re Dreshfield*, 1940 C.D. 351; 518 O.G. 255 gives this general rule: "It is well settled that in cases involving chemicals and chemical compounds, which differ radically in their properties it must appear in an applicant's specification either by the enumeration of a sufficient number of the members of a group or by other appropriate language, that the chemicals or chemical combinations included in the claims are capable of accomplishing the desired result." . . .

claimed invention, in view of the unpredictability in the art, the breadth of the claims, the limited number of working examples and the limited guidance provided in the specification. With respect to unpredictability, the examiner stated that

[t]he cyanobacteria comprise a large and diverse group of photosynthetic bacteria including large numbers of species in some 150 different genera including *Synechocystis*, *Anacystis*, *Synechococcus*, *Agmenellum*, *Nostoc*, *Anabaena*, etc. The molecular biology of these organisms has only recently become the subject of intensive investigation and this work is limited to a few genera. Therefore the level of unpredictability regarding heterologous gene expression in this large, diverse and relatively poorly studied group of procaryotes is high. . . .

The Board affirmed, noting that "the limited guidance in the specification, considered in light of the relatively high degree of unpredictability in this particular art, would not have enabled one having ordinary skill in the art to practice the broad scope of the claimed invention without undue experimentation. *In re Fisher*, 427 F.2d 833, 166 USPQ 18 (CCPA 1970)."

## OPINION

### A. Obviousness

We first address whether the PTO erred in rejecting the claims on appeal as prima facie obvious within the meaning of 35 USC 103. Obviousness is a legal question which this court independently reviews, though based upon underlying factual findings which we review under the clearly erroneous standard. *In re Woodruff*, 919 F.2d 1575, 1577, 16 USPQ2d 1934, 1935 (Fed. Cir. 1990).

[1] Where claimed subject matter has been rejected as obvious in view of a combination of prior art references, a proper analysis under § 103 requires, *inter alia*, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success. See *In re Dow Chemical Co.*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988). Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the applicant's disclosure. *Id.*

[2] We agree with the examiner's position that the prior art has not established obviousness of the claimed art simply does not express an expectation of gene encoding an insecticidal protein, or convey to reasonable expectation of success. More particularly, Dzelzkalns, the prior art, against all claims, closed plasmid a *Bacillus* insecticidal gene utilized for the expression of antibiotic genes in cyanobacteria, not render obvious related genes in cyanobacteria for the purposes.

The PTO argued that the insecticidal *Bacillus* genes in cyanobacteria are secondary references. Ganesan, which is a disclosure of genes encoding insecticidal proteins in two species of bacteria (*B. megaterium*) as in the bacterium references disclose genes encoding insecticidal proteins in transformed hosts.

To remedy this, the PTO emphasizes similar cyanobacteria, not procaryotic organisms, would suggest the use of cyanobacteria in the claim is true that bacteria now both classified alone is not sufficient as the PTO concedes, cyanobacteria are identical; they are divisions of the same genus. Moreover, it is the biology of cyanobacteria as evidenced by "blue-green algae" uncertainty regarding

<sup>21</sup> *Stedman's Manual* (1982) (definition of cyanobacteria are to the following Division; Class; (Bergey's Manual 1601 (1989).

ion, in view of the unpredictability, the breadth of the claims, number of working examples and evidence provided in the specification to unpredictability, the fact that

bacteria comprise a large and diverse group of photosynthetic bacteria, large numbers of species in some genera including *Synechocystis*, *Synechococcus*, *Agmenicoccus*, *Anabaena*, etc. The molecular biology of these organisms has only recently become the subject of intensive study and this work is limited to a small area. Therefore the level of unpredictability regarding heterologous gene expression in this large, diverse and relatively unstudied group of procaryotes

is affirmed, noting that "the evidence in the specification, considering the relatively high degree of predictability in this particular art, would lead one having ordinary skill in the art to practice the broad scope of the claim without undue experimentation." *Fisher*, 427 F.2d 833, 166 USPQ2d 1575 (CA-9, 1970).

## OPINION

Whether the PTO erred in its decision on appeal as *prima facie* obvious is a legal question which this court recently reviewed, though based on different factual findings which were clearly erroneous standard. *Ex parte Dow Chemical Co.*, 919 F.2d 1575, 1577, 16 USPQ2d 1529, 1531 (Fed. Cir. 1990).

The claimed subject matter has been found obvious in view of a combination of references, a proper analysis requires, *inter alia*, considerations: (1) whether the prior art suggested to those of ordinary skill that they should make the composition or device, or carry out the process; and (2) whether the prior art also have revealed that in so doing, those of ordinary skill would have a reasonable expectation of success. *In re Dow Chemical Co.*, 837 F.2d 1529, 1531 (Fed. Cir. 1987). With the suggestion and the realization of success must be found in the prior art, not in the application. *Id.*

[2] We agree with appellants that the PTO has not established the *prima facie* obviousness of the claimed subject matter. The prior art simply does not disclose or suggest the expression in cyanobacteria of a chimeric gene encoding an insecticidally active protein, or convey to those of ordinary skill a reasonable expectation of success in doing so. More particularly, there is no suggestion in Dzelzkalns, the primary reference cited against all claims, of substituting in the disclosed plasmid a structural gene encoding *Bacillus* insecticidal proteins for the CAT gene utilized for selection purposes. The expression of antibiotic resistance-conferring genes in cyanobacteria, without more, does not render obvious the expression of unrelated genes in cyanobacteria for unrelated purposes.

The PTO argues that the substitution of insecticidal *Bacillus* genes for CAT marker genes in cyanobacteria is suggested by the secondary references Sekar I, Sekar II, and Ganesan, which collectively disclose expression of genes encoding *Bacillus* insecticidal proteins in two species of host *Bacillus* bacteria (*B. megaterium* and *B. subtilis*) as well as in the bacterium *E. coli*. While these references disclose expression of *Bacillus* genes encoding insecticidal proteins in certain transformed bacterial hosts, nowhere do these references disclose or suggest expression of such genes in transformed cyanobacterial hosts.

To remedy this deficiency, the PTO emphasizes similarity between bacteria and cyanobacteria, namely, that these are both procaryotic organisms, and argues that this fact would suggest to those of ordinary skill the use of cyanobacteria as hosts for expression of the claimed chimeric genes. While it is true that bacteria and cyanobacteria are now both classified as procaryotes, that fact alone is not sufficient to motivate the art worker as the PTO contends. As the PTO concedes, cyanobacteria and bacteria are not identical; they are classified as two separate divisions of the kingdom Procaryotae.<sup>21</sup> Moreover, it is only in recent years that the biology of cyanobacteria has been clarified, as evidenced by references in the prior art to "blue-green algae." Such evidence of recent uncertainty regarding the biology of cyano-

bacteria tends to rebut, rather than support, the PTO's position that one would consider the cyanobacteria effectively interchangeable with bacteria as hosts for expression of the claimed gene.

At oral argument the PTO referred to additional secondary references, not cited against any independent claim (i.e., Friedberg, Miller, and Nierzwicki-Bauer), which it contended disclose certain amino acid sequence homology between bacteria and cyanobacteria. The PTO argued that such homology is a further suggestion to one of ordinary skill to attempt the claimed invention. We disagree. As with the Dzelzkalns, Sekar I, Sekar II, and Ganesan references discussed above, none of these additional references disclose or suggest that cyanobacteria could serve as hosts for expression of genes encoding *Bacillus* insecticidal proteins. In fact, these additional references suggest as much about differences between cyanobacteria and bacteria as they do about similarities. For example, Nierzwicki-Bauer reports that a certain nucleotide sequence (i.e., the -10 consensus sequence) in a particular cyanobacterium resembles an *E. coli* promoter, but that another nearby nucleotide sequence (the -35 region) does not. While Miller speaks of certain promoters of the bacteriophage Lambda that are recognized by both cyanobacterial and *E. coli* RNA polymerases, it also discloses that these promoters exhibited differing strengths when exposed to the different polymerases. Differing sensitivities of the respective polymerases to an inhibitor are also disclosed, suggesting differences in the structures of the initiation complexes.

The PTO asks us to agree that the prior art would lead those of ordinary skill to conclude that cyanobacteria are attractive hosts for expression of any and all heterologous genes. Again, we can not. The relevant prior art does indicate that cyanobacteria are attractive hosts for expression of both native and heterologous genes involved in photosynthesis (not surprisingly, for the capability of undergoing oxygenic photosynthesis is what makes the cyanobacteria unique among procaryotes). However, these references do not suggest that cyanobacteria would be equally attractive hosts for expression of unrelated heterologous genes, such as the claimed genes encoding *Bacillus* insecticidal proteins.

In *O'Farrell*, this court affirmed an obviousness rejection of a claim to a method for

<sup>21</sup> *Stedman's Medical Dictionary* 1139 (24th ed. 1982) (definition of "Procaryotae"). Procaryotic organisms are commonly classified according to the following taxonomic hierarchy: Kingdom; Division; Class; Order; Family; Genus; Species. 3 *Bergey's Manual of Systematic Bacteriology* 1601 (1989).

producing a "predetermined protein in a stable form" in a transformed bacterial host. 853 F.2d at 895, 7 USPQ2d at 1674. The cited references included a prior art publication (the Polisky reference) whose three authors included two of the three coinventor-appellants. The main difference between the prior art and the claim at issue was that in Polisky, the heterologous gene was a gene for ribosomal RNA, while the claimed invention substituted a gene coding for a predetermined protein. *Id.* at 901, 7 USPQ2d at 1679. Although, as the appellants therein pointed out, the ribosomal RNA gene is not normally translated into protein, Polisky mentioned preliminary evidence that the transcript of the ribosomal RNA gene was translated into protein, and further predicted that if a gene coding for a protein were to be substituted, extensive translation might result. *Id.* We thus affirmed, explaining that

the prior art explicitly suggested the substitution that is the difference between the claimed invention and the prior art, and presented preliminary evidence suggesting that the [claimed] method could be used to make proteins.

... Polisky contained detailed enabling methodology for practicing the claimed invention, a suggestion to modify the prior art to practice the claimed invention, and evidence suggesting that it would be successful.

*Id.* at 901-02, 7 USPQ2d at 1679-80.

In contrast with the situation in *O'Farrell*, the prior art in this case offers no suggestion, explicit or implicit, of the substitution that is the difference between the claimed invention and the prior art. Moreover, the "reasonable expectation of success" that was present in *O'Farrell* is not present here. Accordingly, we reverse the § 103 rejections.

#### B. Enablement

[3] The first paragraph of 35 USC 112 requires, *inter alia*, that the specification of a patent enable any person skilled in the art to which it pertains to make and use the claimed invention. Although the statute does not say so, enablement requires that the specification teach those in the art to make and use the invention without "undue experimentation." *In re Wands*, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988). That some experimentation may be required is not fatal; the issue is whether the amount

of experimentation required is "undue." *Id.* at 736-37, 8 USPQ2d at 1404. Enablement, like obviousness, is a question of law which we independently review, although based upon underlying factual findings which we review for clear error. *See id.* at 735, 8 USPQ2d at 1402.

In response to the § 112 rejection, appellants assert that their invention is "pioneering," and that this should entitle them to claims of broad scope. Narrower claims would provide no real protection, appellants argue, because the level of skill in this art is so high, art workers could easily avoid the claims. Given the disclosure in their specification, appellants contend that any skilled microbiologist could construct vectors and transform many different cyanobacteria, using a variety of promoters and *Bacillus* DNA, and could easily determine whether or not the active *Bacillus* protein was successfully expressed by the cyanobacteria.

The PTO made no finding on whether the claimed invention is indeed "pioneering," and we need not address the issue here. With the exception of claims 47 and 48, the claims rejected under § 112 are not limited to any particular genus or species of cyanobacteria. The PTO's position is that the cyanobacteria are a diverse and relatively poorly studied group of organisms, comprising some 150 different genera, and that heterologous gene expression in cyanobacteria is "unpredictable." Appellants have not effectively disputed these assertions. Moreover, we note that only one particular species of cyanobacteria is employed in the working examples of appellants' specification, and only nine genera of cyanobacteria are mentioned in the entire document.

[4] Taking into account the relatively incomplete understanding of the biology of cyanobacteria as of appellants' filing date, as well as the limited disclosure by appellants of particular cyanobacterial genera operative in the claimed invention, we are not persuaded that the PTO erred in rejecting claims 1-46 and 50-51 under § 112, first paragraph. There is no reasonable correlation between the narrow disclosure in appellants' specification and the broad scope of protection sought in the claims encompassing gene expression in any and all cyanobacteria. *See In re Fisher*, 427 F.2d 833, 839, 166 USPQ 18, 24 (CCPA 1970) (the first paragraph of § 112 requires that the scope of the claims must bear a reasonable correlation to the scope of enablement provided by the specifi-

cation).<sup>22</sup> rejection :

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the evidence, the factfinder's choice between them cannot be clearly erroneous." *Anderson v. City of Bessemer City*, 470 U.S. 564, 574 (1985). The mere denomination of obviousness as a question of law does not give the court license to decide the factual matters afresh and ignore the requirement that they be respected unless clearly erroneous. *In re Woodruff*, 919 F.2d 1575, 1577, 16 USPQ2d 1934, 1935 (Fed. Cir. 1990); *In re Kulling*, 897 F.2d 1147, 1149, 14 USPQ2d 1056, 1057 (Fed. Cir. 1990). There may be more than one way to look at the prior art, but on this record we are bound by the PTO's interpretation of the evidence because it is not clearly erroneous and its conclusion is unassailable. I would affirm on that basis.

### Court of Appeals, Federal Circuit

Biocraft Laboratories Inc. v. International Trade Commission

Nos. 91-1153, 1208

Decided October 17, 1991

### PATENTS

#### 1. U.S. International Trade Commission — Remedies (§155.07)

### JUDICIAL PRACTICE AND PROCEDURE

Procedure — Settlement agreements; consent decrees (§410.43)

### REMEDIES

Non-monetary and injunctive — Equitable relief — Preliminary injunctions — Bond (§505.0707.03)

International Trade Commission abused its discretion by refusing to release bond posted by respondent to 19 USC 1337 complaint in compliance with temporary cease and desist order, even though respondent made sales of infringing product during effective period of order, since complainant authorized sales in question and agreed to return of bond as part of settlement agreement with respondent, since bond provisions, under terms of order, do not apply to sales authorized by complainant, and since public interest in vindicating rights of patentees, as well as complainant's interest in offsetting competitive advantage respondent obtained by importing infringing product, were satisfied by complainant's agreement to return of

bond and thus would not be furthered by retention of bond by ITC.

Appeal from the U.S. International Trade Commission.

U.S. International Trade Commission investigation no. 337-TA-293, instituted in response to complaint of Bristol-Myers Co., now Bristol-Myers Squibb Co., against, inter alia, Biocraft Laboratories Inc., for violation of Tariff Act's Section 337, 19 USC 1337. From order denying in part respondent's request for return or cancellation of two bonds posted in compliance with temporary cease and desist order, and from order denying respondent's request for reconsideration of prior order, respondent appeals. Reversed.

Prior decision: 15 USPQ2d 1258.

Marc S. Gross, of Bryan, Cave, McPheeters & McRoberts (Michael G. Biggers, Elizabeth C. Carver, David A. Roodman, and Elizabeth M. Garnhard, on brief), New York, N.Y., for appellant.

Marc A. Bernstein (Lyn Schlitt, general counsel, and James A. Toupin, assistant general counsel, on brief), for appellee.

Before Skelton, senior circuit judge, and Newman and Lourie, circuit judges.

Lourie, J.

This is a consolidated appeal from (1) an order of the United States International Trade Commission issued November 14, 1990, in *Crystalline Cefadroxil Monohydrate*, Inv. No. 337-TA-293, No. 91-1153, denying in part Biocraft Laboratories, Inc.'s request for return or cancellation of two bonds and (2) an order of the Commission issued January 11, 1991, Inv. No. 337-TA-293, No. 91-1208, denying Biocraft's request for reconsideration of the prior order. Because we conclude that the Commission's denial of Biocraft's requests was an abuse of discretion, we reverse.

### BACKGROUND

This appeal stems from an investigation begun by the Commission in response to a complaint and motion for temporary relief filed by the Bristol-Myers Company<sup>1</sup> on February 1, 1989. In the complaint, Bristol

<sup>1</sup> The Bristol-Myers Company has since become the Bristol-Myers Squibb Company.

alleged that was violated 1930, 1911 selling cefadroxil (cefadroxil) to the U.S. (entirety). Biocrafts in After an i tol's motion 1989, and vacate the determination was l the Com Myers C Comm'n, (the Com authority seriously to grant 1337 (e) lieve tha 337).

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on required is "undue." *Id.* USPQ2d at 1404. Enablement, is a question of law which is reviewed, although based on factual findings which we do not error. See *id.* at 735, 839.

the § 112 rejection, appellants' invention is "pioneering" in its scope. Narrower claims provide real protection, appellants' level of skill in this art is such that skilled workers could easily avoid the disclosure in their specifications. Appellants contend that any skilled worker could construct vectors and transform different cyanobacteria, using promoters and *Bacillus* to easily determine whether or not a *lacZ* protein was successfully expressed by the cyanobacteria. There is no finding on whether the invention is indeed "pioneering," and appellants address the issue here. With claims 47 and 48, the claims under § 112 are not limited to any one species of cyanobacteria. Appellants' position is that the cyanobacteria used are relatively poorly studied strains, comprising some 150 species, and that heterologous gene expression in cyanobacteria is "unpredictable." Appellants have not effectively disputed the rejection. Moreover, we note that the prior art species of cyanobacteria are working examples of adaptation, and only nine genera are mentioned in the entire

to account the relatively longstanding of the biology of cyanobacteria of appellants' filing date, as well as disclosure by appellants of cyanobacterial genera operative in the invention, we are not persuaded that appellants erred in rejecting claims under § 112, first paragraph. Appellants' reasonable correlation between disclosure in appellants' specifications and broad scope of protection aims encompassing gene expression in all cyanobacteria. See *In re Fisher*, 427 F.2d 833, 839, 166 USPQ 18, 19 (CA-9, 1970) (the first paragraph of § 112, first paragraph of the claims is a reasonable correlation to the invention provided by the specific

cation).<sup>22</sup> Accordingly, we affirm the § 112 rejection as to those claims.

In so doing we do not imply that patent applicants in art areas currently denominated as "unpredictable" must never be allowed generic claims encompassing more than the particular species disclosed in their specification. It is well settled that patent applicants are not required to disclose every species encompassed by their claims, even in an unpredictable art. *In re Angstadt*, 537 F.2d 498, 502-03, 190 USPQ 214, 218 (CCPA 1976). However, there must be sufficient disclosure, either through illustrative examples or terminology,<sup>23</sup> to teach those of ordinary skill how to make and how to use the invention as broadly as it is claimed. This means that the disclosure must adequately guide the art worker to determine, without undue experimentation, which species among all those encompassed by the claimed genus possess the disclosed utility. Where, as here, a claimed genus represents a diverse and relatively poorly understood group of microorganisms, the required level of disclosure will be greater than, for example, the disclosure of an invention involving a "predictable" factor such as a mechanical or electrical element. See *Fisher*, 427 F.2d at 839, 166 USPQ at 24. In this case, we agree with the PTO that appellants' limited disclosure does not enable one of ordinary skill to make and use the invention as now recited in claims 1-46 and 50-51 without undue experimentation.

Remaining dependent claim 47 recites a cyanobacterium which expresses the chimeric gene of claim 1, wherein the cyanobacteri-

um is selected from among the genera *Anacystis* and *Synechocystis*. Claim 48, which depends from claim 47, is limited to the cyanobacterium *Synechocystis* 6803. The PTO did not separately address these claims, nor indicate why they should be treated in the same manner as the claims encompassing all types of cyanobacteria. Although these claims are not limited to expression of genes encoding particular *Bacillus* proteins, we note what appears to be an extensive understanding in the prior art of the numerous *Bacillus* proteins having toxicity to various insects. The rejection of claims 47-48 under § 112 will not be sustained.

## CONCLUSION

The rejection of claims 1-48 and 50-52 under 35 USC 103 is reversed. The rejection of claims 1-46 and 50-51 under 35 USC 112, first paragraph, is affirmed and the rejection of claims 47 and 48 thereunder is reversed.

AFFIRMED-IN-PART, REVERSED-IN-PART

Mayer, J., dissenting.

An appeal is not a second opportunity to try a case or prosecute a patent application, and we should not allow parties to "undertake to retry the entire case on appeal." *Perini America, Inc. v. Paper Converting Machine Co.*, 832 F.2d 581, 584, 4 USPQ2d 1621, 1624 (Fed. Cir. 1987); *Eaton Corp. v. Appliance Valves Corp.*, 790 F.2d 874, 877, 229 USPQ 668, 671 (Fed. Cir. 1986). But that is precisely what the court has permitted here. The PTO conducted a thorough examination of the prior art surrounding this patent application and concluded the claims would have been obvious. The board's decision based on the examiner's answer which comprehensively explains the rejection is persuasive and shows how the evidence supports the legal conclusion that the claims would have been obvious. Yet, the court ignores all this and conducts its own examination, if you will, as though the examiner and board did not exist. Even if I thought this opinion were more persuasive than the board's, I could not join it because it misperceives the role of the court.

The scope and content of the prior art, the similarity between the prior art and the claims, the level of ordinary skill in the art, and what the prior art teaches are all questions of fact. *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966); *Jurgens v. McKasy*, 927 F.2d 1552, 1560, 18 USPQ2d 1031, 1037 (Fed. Cir. 1991). And "[w]here there are two permissible views of

<sup>22</sup> The enablement rejection in this case was not based upon a post-filing date state of the art, as in *In re Hogan*, 559 F.2d 595, 605-07, 194 USPQ 527, 536-38 (CCPA 1977). See also *United States Steel Corp. v. Phillips Petroleum Co.*, 865 F.2d 1247, 1251, 9 USPQ2d 1461, 1464 (Fed. Cir. 1989) (citing *Hogan*); *Hormone Research Found., Inc. v. Genentech, Inc.*, 904 F.2d 1558, 1568-69, 15 USPQ2d 1039, 1047-48 (Fed. Cir. 1990) (directing district court, on remand, to consider effect of *Hogan* and *United States Steel* on the enablement analysis of *Fisher*), cert. dismissed, \_\_\_ U.S. \_\_\_, 111 S. Ct. 1434 (1991). We therefore do not consider the effect of *Hogan* and its progeny on *Fisher's* analysis of when an inventor should be allowed to "dominate the future patentable inventions of others." *Fisher*, 427 F.2d at 839, 166 USPQ at 24.

<sup>23</sup> The first paragraph of § 112 requires nothing more than objective enablement. *In re Marzocchi*, 439 F.2d 220, 223, 169 USPQ 367, 369 (CCPA 1971). How such a teaching is set forth, either by the use of illustrative examples or by broad terminology, is irrelevant. *Id.*

## Court of Appeals, Federal Circuit

In re Fritch

No. 91-1318

Decided August 11, 1992

## JUDICIAL PRACTICE AND PROCEDURE

## 1. Procedure — Judicial review — Standard of review — Patents (§410.4607.09)

Obviousness determination is based on underlying factual inquiries concerning claimed invention and prior art, which are reviewed for clear error on appeal, but ultimate conclusion of obviousness is reviewed as matter of law.

## PATENTS

## 2. Patent construction — Claims — Broad or narrow (§125.1303)

Prior art patent for grass edging and watering device cannot be held to teach that device is flexible and conformable to ground in its entirety, since base portion of device includes prominent anchoring leg which would inhibit longitudinal flexibility, and since patent's express teaching that trench is necessary to install device in harder ground shows that it is not freely conformable thereto.

## 3. Patentability/Validity — Obviousness — Relevant prior art — Particular inventions (§115.0903.03)

## Patentability/Validity — Obviousness — Combining references (§115.0905)

Claims for landscape edging device are not prima facie obvious in view of combined teachings of two prior patents, since primary reference does not suggest overall flexibility and landscape retention function of claimed device, and since secondary reference does not, merely by virtue of flexibility of device described therein, suggest extensive modifications which would bring primary reference into conformity with application claims.

## 4. Patentability/Validity — Obviousness — Combining references (§115.0905)

Mere fact that prior art may be modified to reflect features of claimed invention does not make modification, and hence claimed invention, obvious unless desirability of such modification is suggested by prior art; claimed invention cannot be used as instruction manual or "template" to piece together teachings of prior art so that claimed invention is rendered obvious.

Appeal from the U.S. Patent and Trademark Office, Board of Patent Appeals and Interferences.

Patent application of John R. Fritch (serial no. 06/838,721, landscape apparatus and method). From decision upholding rejection of application claims 1-7, 9-24, 29 and 30, applicant appeals. Reversed.

Charles L. Gholz, of Oblon, Spivak, McClelland, Maier & Neustadt, Arlington, Va. (John R. Fritch, Corpus Christi, Texas, on brief), for appellant.

Jameson Lee, associate solicitor (Fred E. McKelvey, solicitor, with him on brief; Richard E. Schafer, of counsel), for appellee.

Before Smith, senior circuit judge, and Plager and Rader, circuit judges.

Smith, J.

John R. Fritch (Fritch) appeals the 27 February 1991 decision of the Patent and Trademark Office Board of Patent Appeals and Interferences (Board) affirming-in-part the Examiner's final rejection of the remaining claims in Fritch's application entitled Landscape Edging Apparatus and Method.<sup>1</sup> The Examiner concluded that Fritch's invention would have been obvious to one of ordinary skill in the art and was therefore unpatentable under 35 U.S.C. § 103. The Board, except for allowing claim 28, agreed. The Board's decision is reversed.

## Issue

The issue is whether the Board erred in affirming the Examiner's determination that the prior art references of Wilson and Hendrix rendered the subject matter of Fritch's independent claims 1, 13, 24, and 29 obvious to one of ordinary skill in the art.

## Background

In his final rejection, the Examiner rejected claims 1-24 and 27-30 of Fritch's application as unpatentable for obviousness under 35 U.S.C. § 103. Fritch appealed the final rejection to the Board. The Board affirmed the rejection as to claims 1-24, 29 and 30, entered a new ground of rejection for claim 27, and reversed as to claim 28. The Board agreed with the Examiner that the teachings of the Wilson and Hendrix patents rendered

<sup>1</sup> Serial No. 06/838,721.

the subject 13, 24, and in the art. F disposition. argument v The claims 9-24, 29 an

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from the U.S. Patent and Trademark Office, Board of Patent Appeals and Inventions.

Application of John R. Fritch (serial 838,721), landscape apparatus and method of decision upholding rejection of claims 1-7, 9-24, 29 and 30, appeals. Reversed.

Gholz, of Oblon, Spivak, McClellan & Neustadt, Arlington, Va., for Fritch, Corpus Christi, Texas, on appeal.

Lee, associate solicitor (Fred E. Lee, solicitor, with him on brief; E. Schafer, of counsel), for Fritch.

With, senior circuit judge, and Rader, circuit judges.

Fritch (Fritch) appeals the 27 1991 decision of the Patent and Trademark Office Board of Patent Appeals and Inventions (Board) affirming in part the final rejection of the remainder of Fritch's application entitled

Edging Apparatus and Method. The Examiner concluded that Fritch's invention would have been obvious to one of ordinary skill in the art and was therefore rejected under 35 U.S.C. § 103. The Board affirmed the Examiner's decision. The Board's decision is reversed.

#### Issue

The issue is whether the Board erred in its determination that the prior art references of Wilson and Hendrix rendered the subject matter of Fritch's invention obvious to one of ordinary skill in the art.

#### Background

In its final rejection, the Examiner rejected claims 1-24 and 27-30 of Fritch's application as unpatentable for obviousness under 35 U.S.C. § 103. Fritch appealed the final decision to the Board. The Board affirmed the Examiner's decision as to claims 1-24, 29 and 30, but reversed the Board's decision as to claims 25-26, 27-28, 29 and 30. The Board's decision as to claims 25-26, 27-28, 29 and 30 is reversed. The Board's decision as to claims 1-24, 29 and 30 is affirmed.

06/838,721.

the subject matter of independent claims 1, 13, 24, and 29 obvious to one of ordinary skill in the art. Fritch does not appeal the Board's disposition as to claims 27 and 28, and at oral argument withdrew the appeal as to claim 8. The claims remaining in this appeal are 1-7, 9-24, 29 and 30.

#### The Fritch Invention

The invention claimed by Fritch involves a landscape edging device which includes a planar base portion and an upwardly extending retainer portion. The base portion is elongate, thin, flexible and has a planar bottom surface conformable to a varying slope ground surface. One longitudinal edge of the base portion serves as a mowing strip and the other serves as a retaining flange for landscape fill. The upwardly extending retainer portion is integrally connected (e.g., fused) to the base portion and defines a longitudinally extending enclosed space. The Fritch invention is intended to be used as a retainer for landscape fill in order to separate unmowable landscape fill from the mowable lawn. It may also be used to secure a landscaping sheet to the ground, or to function as guards at the base of a fence. Independent claims 1 and 13 on appeal are representative of the subject matter claimed:

1. A landscape edging strip formed in its entirety of a thin gauge, flexible material and conformable to a ground surface of varying slope, comprising a continuous elongate, thin gauge, flexible base portion having a planar bottom surface conformable to said varying slope ground surface; a thin gauge, elongate retainer portion integral with said base portion and extending upwardly therefrom and transversely thereover to overlie a portion of said base portion; all of said retainer portion defining a longitudinally extending enclosed space; said retainer portion being integrally connected to said base portion adjacent one longitudinal edge of said base portion to define a mowing strip adjacent the other longitudinal edge of said base portion.

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13. A landscape edging strip formed in its entirety from thin gauge, flexible material and conformable to a ground surface of varying slope, comprising a continuous elongate, thin gauge, flexible base portion having a planar bottom surface conformable to said varying slope ground surface; a thin gauge, elongate retainer portion

integral with said base portion and extending upwardly therefrom and transversely thereover to overlie a portion of said base portion; all of said retainer portion defining a longitudinally extending enclosed space; said retainer portion being integrally connected to said base portion at a transverse location between the longitudinal edges of said base portion, thereby defining a longitudinally extending retaining flange on one side of said retainer portion and a mowing strip on the other side of said retainer portion.

\*\*\*\*\*

The critical language in Fritch's independent claims is that the device is to be, in its entirety, both flexible and "conformable to a ground surface of varying slope". These limitations, although located in the claims' preambles, "are necessary to give meaning to the claim[s] and properly define the invention".<sup>2</sup> Figure 1 from Fritch's drawings is reproduced below:

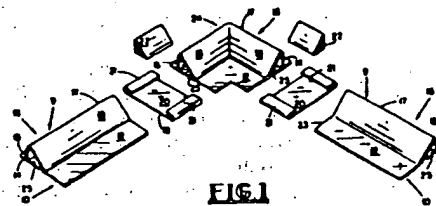


FIG. 1

#### The Prior Art

a. The Wilson Patent

The Wilson patent relied upon by the Examiner and the Board is entitled "Grass Edging and Watering Device".<sup>3</sup> The embodiment of the Wilson device includes a substantially flat mowing strip extending horizontally from a longitudinally extending body portion. Opposite the mowing strip is a scored flange which may be broken off when not needed or wanted. Between the mowing strip and the flange, and extending vertically from the body portion is an anchoring leg. Located above the anchoring leg is the body portion which contains a water conduit and sprinkler head assembly. The device is intended to be used adjacent to the borders of walks and plant beds. Figures 1 and 4 from Wilson's drawings are reproduced below:

<sup>2</sup> Perkin Elmer Corp. v. Computervision Corp., 732 F.2d 888, 896, 221 USPQ 669, 675 (Fed. Cir. 1984).

<sup>3</sup> U.S. Patent No. 3,485,449.

## Standard of Review

[1] "[O]bviousness is a question of law to be determined from the facts."<sup>5</sup> The obviousness determination "is based upon underlying factual inquiries concerning the claimed invention and the prior art" which are reviewed for clear error.<sup>6</sup> However, it is the ultimate conclusion of obviousness which the Federal Circuit reviews as a matter of law.<sup>7</sup>

## Teachings of Wilson

Fritch takes exception to the Examiner's findings of fact related to the teachings of the Wilson patent. The Examiner's rejection and the Board's opinion rely heavily on the use of Wilson in view of other references to declare the Fritch invention obvious. The Board states that it agrees with the Examiner's finding of fact regarding the teachings of Wilson. In the Examiner's answer, which the Board quotes, the Wilson device is described as follows:

Wilson discloses a landscaping edging strip comprising a relatively thin gauge, elongated flexible base portion including a mower strip B having a planar bottom surface conformable to a varying slope surface.

The Board states that the Wilson reference presents "substantial evidence that Wilson is both thin and flexible." The Board regards the Wilson device as teaching that it is flexible and conformable in its entirety. This finding demonstrates clear error.

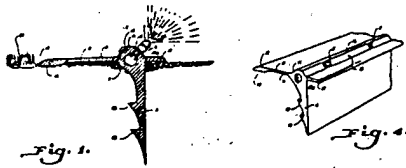
[2] It is well settled that a prior art reference is relevant for all that it teaches to those of ordinary skill in the art.<sup>8</sup> The base portion of Wilson is not planar in its entirety, as the Board's opinion suggests, but also includes a prominent anchoring leg to secure the device to the ground. The anchoring leg, which runs the length of the Wilson device, would inhibit longitudinal flexibility of the Wilson device. Indeed, Wilson expressly contemplates flexibility and conformability *only* in the mower strip. Wilson states that its mower strip may be lifted in order to pack dirt thereunder for the purpose of securing the device to the ground. Fritch, on the other hand, is claimed to be flexible in its entirety.

<sup>5</sup> *In re De Blauwe*, 736 F.2d 699, 703, 222 USPQ 191, 195 (Fed. Cir. 1984).

<sup>6</sup> *In re Kulling*, 897 F.2d 1147, 1149, 14 USPQ2d 1056, 1057 (Fed. Cir. 1990).

<sup>7</sup> *In re De Blauwe*, 736 F.2d at 703, 222 USPQ at 195.

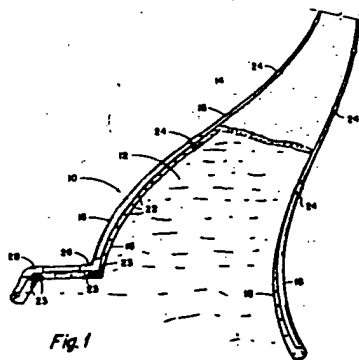
<sup>8</sup> *Beckman Instruments Inc. v. LKB Produkter AB*, 892 F.2d 1547, 1551, 13 USPQ2d 1301, 1304 (Fed. Cir. 1989).



## b. The Hendrix Patent

The Hendrix patent is entitled "Loose Material Retainer Strip".<sup>4</sup> The Solicitor chose not to discuss the Hendrix reference in his brief, stating that the Board had deemed Hendrix unnecessary to its decision. The Solicitor overstates the Board's position. The Board based its decision upon "a collective evaluation of the Wilson and Hendrix patents". We include Hendrix in our discussion because it did play a role in the rejection of Fritch's independent claims.

The Hendrix device is composed of elongated, flexible strips having substantially C-shaped cross-section. The bottom lip of the device is to be wider than the top lip in order to facilitate fastening the device to the ground. The device will fit most gentle contours, and the top lip will yield laterally to build-up of gravel until the gravel can be redistributed. The concave portion of the strip is installed such that it faces the material to be retained in place. Hendrix contemplates that the retainer will be used in retaining gravel in driveways, lining flower beds, or on the shoulders of asphalt or concrete highways. Figure 1 of Hendrix's drawings is reproduced below:



<sup>4</sup> U.S. Patent No. 4,349,596.

The Board in its entire opinion of the

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<sup>9</sup> *In re Pit* USPQ 785.

<sup>10</sup> *In re Fi* 1596, 1598 747 F.2d 70 (Cir. 1988)).

<sup>11</sup> *In re H* 676, 678 (C

<sup>15</sup> *ACS Hosp. Systems, Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984).

the desirability of the modification.<sup>14</sup> Wilson and Hendrix fail to suggest any motivation for, or desirability of, the changes espoused by the Examiner and endorsed by the Board.

Here, the Examiner relied upon hindsight to arrive at the determination of obviousness. It is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious.<sup>15</sup> This court has previously stated that "[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention."<sup>16</sup>

#### Conclusion

The decision of the Board affirming the Examiner's rejection of independent claims 1, 13, 24, and 29 of Fritch's application as unpatentable over the prior art under 35 U.S.C. § 103 is reversed. Since dependent claims are nonobvious if the independent claims from which they depend are nonobvious, the Board's affirmation of the rejection of dependent claims 2-7, 9-12, 14-23, and 30 is also reversed.<sup>17</sup>

#### REVERSED

#### U.S. Patent and Trademark Office Trademark Trial and Appeal Board

CBS Inc. v. Mercandante

Nos. 85,324 and 85,330

Decided June 15, 1992

<sup>14</sup> *In re Gordon*, 733 F.2d at 902, 221 USPQ at 1127.

<sup>15</sup> *In re Gorman*, 933 F.2d 982, 987, 18 USPQ2d 1885, 1888 (Fed. Cir. 1991). See also *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1138, 227 USPQ 543, 547 (Fed. Cir. 1985).

<sup>16</sup> *In re Fine*, 837 F.2d at 1075, 5 USPQ2d at 1600.

<sup>17</sup> *In re Fine*, 837 F.2d at 1076, 5 USPQ2d at 1600 (citing *Hartness Int'l, Inc. v. Simplimatic Eng'g Co.*, 819 F.2d 1100, 1108, 2 USPQ2d 1826, 1831 (Fed. Cir. 1987)). See also *In re Sernaker*, 702 F.2d 989, 991, 217 USPQ 1, 3 (Fed. Cir. 1983) (when argued together, dependent claims stand or fall with the independent claims from which they depend).

Released June 25, 1992

#### TRADEMARKS AND UNFAIR TRADE PRACTICES

##### 1. Acquisition, assignment, and maintenance of marks — Acquisition through use — Priority of use (§305.0503)

##### Practice and procedure in Patent and Trademark Office — Interpartes proceedings — Opposition and cancellation — In general (§325.0305.01)

##### Infringement; conflicts between marks — Likelihood of confusion — In general (§335.0301)

Opposer which uses mark "Rescue: 911" for its television show, which asserts that it has licensed use of mark on various merchandise items, and which seeks to oppose registration of "911 Rescue Bars," for candy bars, must clearly indicate in its pleading whether its claim of likelihood of confusion is based upon its services or its collateral merchandise, or both, and whether it claims priority of use of its mark on its collateral merchandise.

Consolidated trademark oppositions no. 85,324 and 85,330, by CBS Inc. against James V. Mercandante and Rose Marie Mercandante, d/b/a 911 Rescue Bar, applications serial no. 74/076,762, filed July 9, 1990, and 74/081,873, filed July 25, 1990, in which applicants counterclaim to cancel opposer's pleaded registration. On opposer's motion to amend its answer to counterclaim, and on applicant's motions to strike opposer's affirmative defenses, and for judgment on the pleadings. Motion for judgment on pleadings granted in part.

David S. Fishman, Windsor, Conn., for applicants.

Marshall J. Nelson, Washington, D.C., for opposer.

Before Sams, Rice, and Quinn, members.

#### By the board.

James V. Mercandante and Rose Marie Mercandante filed applications to register

present. For these reasons, the court adopts the modified jurisdiction test.<sup>7</sup>

[2] The court determines, without hesitation, that Turbo Tek has the continuous and systematic contacts with North Carolina necessary to support general jurisdiction and thus venue. In the last year, Turbo Tek has sold in North Carolina 30,570 of its pressure washers, 24,720 bottles of soft suds, 7,164 bottles of hard suds, 81,678 bottles of exploding wax, and 864 unspecified products. North Carolina accounts for 3.6% of Turbo Tek's total sales, yielding Turbo Tek over \$300,000.00 in the last year. Turbo Tek transports these goods directly from its facilities in California to its customers in North Carolina. In addition, Turbo Tek has a sales representative who permanently resides in North Carolina and solicits sales throughout the state. Turbo Tek's Vice

<sup>7</sup> The Fourth Circuit has not explicitly addressed the proper test for determining "doing business" venue. The two Fourth Circuit cases mentioning "doing business" venue have merely recited the contacts with the forum and then concluded that venue is proper. See *In Re Ralston Purina Co.*, 726 F.2d 1002, 1003 (4th Cir. 1984) (recites contacts and then merely states that "Purina 'is doing business' under 28 U.S.C. §1391(c)"); *Du-Al Corp. v. Rudolph Beaver, Inc.*, 540 F.2d 1230, 1231, 1233 (4th Cir. 1976) (recites contacts then merely states that "collectively these activities constituted 'doing business'"). Arguably, by explaining that the contacts satisfied personal jurisdiction and then concluding that these same contacts amounted to "doing business", *Du-Al* equates venue and personal jurisdiction. A few cases have interpreted *Du-Al* as equating venue and personal jurisdiction. See e.g. *Precision Rubber Products v. George McCarthy, Inc.*, 605 F.Supp. 473, 477 (M.D.Tenn. 1984). 1985); *Witzel v. Chartered Systems Corp. of N.Y.*, 490 F.Supp. 343, 348 (D.Minn. 1980). See also Note, 65 Tex.L.Rev. at n.57 and accompanying text (interprets *Du-Al* as equating venue and personal jurisdiction). Yet, a recent case states that *Du-Al* "might be said to have adopted this view [i.e. the jurisdiction test] . . . although less clearly . . . and with less discussion [than the other cases adopting the view]." *Maybelline Co.*, 813 F.2d at n.5 [2 USPQ2d at 1127 n.5] (emphasis added). Moreover, *Du-Al* was decided before the Supreme Court, in *Leroy*, expressed that venue statutes are designed to protect the defendant from an inconvenient forum. In sum, given the inexplicitness of *Du-Al*, the conflicting interpretations of *Du-Al* by other courts, and the fact *Du-Al* was decided before *Leroy*, this court may appropriately attempt to refine the "doing business" standard in the this circuit. As such, the court herein adopts the modified jurisdiction test. The court notes, however, that venue is proper in the instant case under either the jurisdiction or the modified jurisdiction test.

President has, on at least one occasion, visited customers within North Carolina. Furthermore, Turbo Tek has run television advertisements on seventeen local television stations in North Carolina. Finally, Turbo Tek operates a mail order business, under the name Distribution Systems International, that has received and honored mail orders from North Carolinians. The court, accordingly, concludes that under the modified jurisdiction test Turbo Tek is "doing business" in North Carolina, thereby establishing venue under §1391(c).<sup>8</sup>

### CONCLUSION

The court concludes that plaintiff complied with Fed.R.Civ.P. 4(c)(2)(C)(ii) in personally serving defendant, outside the forum state, with notice of this action. The court further concludes that defendant is "doing business" in North Carolina and thus venue is proper under 28 U.S.C. §1391(c). The court, accordingly, denies defendant's motion to dismiss.

### Court of Appeals, Federal Circuit

In re Fine

No. 87-1319

Decided January 26, 1988

### PATENTS

#### 1. Patentability/Validity — Obviousness — Evidence of (§115.0903)

Patent and Trademark Office improperly rejected claimed invention for obviousness since nothing in cited references, either alone or in combination, suggests or teaches claimed invention, since there is consequently no support for PTO's conclusion that substitution of one type of detector for another in prior art system, resulting in claimed invention, would have been obvious, and since PTO therefore failed to satisfy its burden of establishing prima facie case of obviousness by showing some objective teaching or gener-

<sup>8</sup> Because the court finds venue proper under §1391(c), it will not address whether the claims herein arose in North Carolina. See 28 U.S.C. §1391(b).

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at least one occasion, within North Carolina. Furtek has run television advertisement in North Carolina. Finally, Turbo Mail order business, under the name of International Systems International, and honored mail orders in North Carolina. The court, accordingly, under the modified *in re* Furtek is "doing business", thereby establishing venue.

## CONCLUSION

The court concludes that plaintiff cannot establish venue under Civ.P. 4(c)(2)(C)(ii) in this case. The defendant, outside the forum of this action. The court concludes that defendant is not in North Carolina and thus under 28 U.S.C. §1391(c), venue is denied defendant's motion.

Appeals, Federal Circuit

In re Fine

No. 87-1319

January 26, 1988

## Validity — Obviousness — §115.0903

The Patent and Trademark Office improperly rejected the invention for obviousness under 35 USC 103. The cited references, either alone or in combination, suggest or teach the invention, since there is consequent PTO's conclusion that sub-type of detector for another machine, resulting in claimed invention, have been obvious, and since the court is required to satisfy its burden of a *prima facie* case of obviousness by objective teaching or genera-

The court finds venue proper under 28 U.S.C. §1391(c) and address whether the claims are directed to North Carolina. See 28 U.S.C.

ally available knowledge that would lead one skilled in art to combine teachings of existing references.

## 2. Patentability/Validity — Obviousness — In general (§115.0901)

Obviousness is tested by what combined teachings of prior art references would have suggested to those of ordinary skill in art, not by whether particular combination of elements from such references might have been "obvious to try."

## 3. Patentability/Validity — Obviousness — Evidence of (§115.0903)

Patent and Trademark Office erred, in rejecting as obvious system for detecting and measuring minute quantities of nitrogen compounds, by failing to recognize that appealed claims can be distinguished over combination of prior art references, in view of evidence demonstrating that prior art does not teach claimed temperature range, despite some overlap of preferred temperature ranges for claimed invention and prior art, since purposes of preferred temperature ranges are different and overlap is mere happenstance.

## 4. Patentability/Validity — Obviousness — In general (§115.0901)

Dependent claims are non-obvious under 35 USC 103 if claims from which they depend are non-obvious.

Appeal from the U.S. Patent and Trademark Office Board of Patent Appeals and Interferences.

Application for patent by David H. Fine, Serial No. 512,374. From decision of Board of Patent Appeals and Interferences affirming rejection of application, applicant appeals. Reversed; Smith, circuit judge, dissenting with opinion.

Morris Relson and Darby & Darby, New York, N.Y., (Beverly B. Goodwin with them on the brief) for appellant.

Lee E. Barrett, associate solicitor, Arlington, Va., (Joseph F. Nakamura, solicitor, and Fred E. McKelvey, deputy solicitor, with him on the brief) for appellee.

Before Friedman, Smith, and Mayer, circuit judges.

Mayer, J.

David H. Fine appeals from a decision of the Board of Patent Appeals and Interfer-

ences of the United States Patent and Trademark Office (Board) affirming the rejection of certain claims of his application, Serial No. 512,374, and concluding that his invention would have been obvious to one of ordinary skill in the art and was therefore unpatentable under 35 U.S.C. §103. We reverse.

## Background

### A. The Invention.

The invention claimed is a system for detecting and measuring minute quantities of nitrogen compounds. According to Fine, the system has the ability to detect the presence of nitrogen compounds in quantities as minute as one part in one billion, and is an effective means to detect drugs and explosives, which emanate nitrogen compound vapors even when they are concealed in luggage and closed containers.

The claimed invention has three major components: (1) a gas chromatograph which separates a gaseous sample into its constituent parts; (2) a converter which converts the nitrogen compound effluent output of the chromatograph into nitric oxide in a hot, oxygen-rich environment; and (3) a detector for measuring the level of nitric oxide. The claimed invention's sensitivity is achieved by combining nitric oxide with ozone to produce nitrogen dioxide which concurrently causes a detectable luminescence. The luminescence, which is measured by a visual detector, shows the level of nitric oxide which in turn is a measure of nitrogen compounds found in the sample.

The appealed claims were rejected by the Patent and Trademark Office (PTO) under 35 U.S.C. §103. Claims 60, 63, 77 and 80 were rejected as unpatentable over Eads, Patent No. 3,650,696 (Eads) in view of Warnick, et al., Patent No. 3,746,513 (Warnick). Claims 62, 68, 69, 79, 85 and 86 were rejected as unpatentable over Eads and Warnick in view of Glass, et al., Patent No. 3,207,585 (Glass).

### B. The Prior Art.

#### 1. Eads Patent.

Eads discloses a method for separating, identifying and quantitatively monitoring sulfur compounds. The Eads system is used primarily in "air pollution control work in the scientific characterization of odors from sulfur compounds."

The problem addressed by Eads is the tendency of sulfur compounds "to adhere to or react with the surface materials of the sampling and analytical equipment, and/or react with the liquid or gaseous materials in the equipment." Because of this, the accu-



cy of measurement is impaired. To solve the problem, the Eads system collects an air sample containing sulfur compounds in a sulfur-free methanol solution. The liquid is inserted into a gas chromatograph which separates the various sulfur compounds. The compounds are next sent through a pyrolysis furnace where they are oxidized to form sulfur dioxide. Finally, the sulfur dioxide passes through a measuring device called a microcoulometer which uses titration cells to calculate the concentration of sulfur compounds in the sample.

#### 2. Warnick Patent.

Warnick is directed to a means for detecting the quantity of pollutants in the atmosphere. By measuring the chemiluminescence of the reaction between nitric oxide and ozone, the Warnick device can detect the concentration of nitric oxide in a sample gaseous mixture.

Warnick calls for "continuously flowing" a sample gaseous mixture and a reactant containing ozone into a reaction chamber. The chemiluminescence from the resulting reaction is transmitted through a light-transmitting element to produce continuous readouts of the total amount of nitric oxide present in the sample.

#### 3. Glass Patent.

The invention disclosed in Glass is a device for "completely burning a measured amount of a substance and analyzing the combustion products." A fixed amount of a liquid petroleum sample and oxygen are supplied to a flame. The flame is then spark-ignited, causing the sample to burn. The resulting combustion products are then collected and measured, and from this measurement the hydrogen concentration in the sample is computed.

#### C. The Rejection.

The Examiner rejected claims 60, 63, 77 and 80 because "substitution of the [nitric oxide] detector of Warnick for the sulfur detector of Eads would be an obvious consideration if interested in nitrogen compounds, and would yield the claimed invention." He further asserted that "Eads teaches the [claimed] combination of chromatograph, combustion, and detection, in that order. . . . Substitution of detectors to measure any component of interest is well within the skill of the art." In rejecting claims 62, 68, 69, 79, 85 and 86, the Examiner said, "Glass et al. teach a flame conversion means followed by a detector, and substitution of the flame conversion means of Glass et al. for the furnace of Eads would be an obvious equivalent and would yield the claimed invention." The Board affirmed the Examiner's rejection.

### Discussion

#### A. Standard of Review.

Obviousness under 35 U.S.C. §103 is "a legal conclusion based on factual evidence." *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, F.2d 1530, 1535, 218 USPQ 871, 876 (Fed. Cir. 1983) (quoting *Stevenson v. Int'l Trade Comm'n*, 612 F.2d 546, 549, 204 USPQ 276, 279 (CCPA 1979)). Therefore, an obviousness determination is not reviewed under the clearly erroneous standard applicable to fact findings, *Raytheon Co. v. Roper Corp.*, 724 F.2d 951, 956, 220 USPQ 592, 596 (Fed. Cir. 1983); it is "reviewed for correctness or error as a matter of law." *In re De Blauwe*, 736 F.2d 699, 703, 222 USPQ 191, 195 (Fed. Cir. 1984).

To reach a proper conclusion under §103, the decisionmaker must step backward in time and into the shoes worn by [a person having ordinary skill in the art] when the invention was unknown and just before it was made. In light of *all* the evidence, the decisionmaker must then determine whether . . . the claimed invention as a whole would have been obvious at *that* time to *that* person. 35 U.S.C. §103. The answer to that question partakes more of the nature of law than of fact, for it is an ultimate conclusion based on a foundation formed of all the probative facts.

*Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1566, 1 USPQ2d 1593, 1595-96 (Fed. Cir. 1987).

#### B. Prima Facie Obviousness.

Fine says the PTO has not established a *prima facie* case of obviousness. He contends the references applied by the Board and Examiner were improperly combined, using hindsight reconstruction, without evidence to support the combination and in the face of contrary teachings in the prior art. He argues that the appealed claims were rejected because the PTO thought it would have been "obvious to try" the claimed invention, an unacceptable basis for rejection.

[1] We agree. The PTO has the burden under section 103 to establish a *prima facie* case of obviousness. See *In re Piasecki*, 745 F.2d 1468, 1471-72, 223 USPQ 785, 787-87 (Fed. Cir. 1984). It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. *In re Lulu*, 747 F.2d 703, 705, 223 USPQ 1257, 1258 (Fed. Cir. 1984); see also *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*,

## Discussion

## Review.

Under 35 U.S.C. §103 is "a based on factual evidence." *ex. v. Aeroquip Corp.*, 722 F.2d 1530, 1535, 218 USPQ 2d 933 (Fed. Cir. 1983) (quoting *Stevens Comm'n*, 612 F.2d 546, 276, 279 (CCPA 1979)). Obviousness determination is under the clearly erroneous rule to fact findings, *Raytheon Corp.*, 724 F.2d 951, 956, 596 (Fed. Cir. 1983); it is correctness or error as a matter of law. *De Blauwe*, 736 F.2d 699, 191, 195 (Fed. Cir. 1984).

Under conclusion under §103, the examiner must step backward in the shoes worn by [a person of ordinary skill in the art] when the facts are unknown and just before the weight of all the evidence, the examiner must then determine whether the claimed invention as a whole would have been obvious at that time. 35 U.S.C. §103. The question partakes more of the nature of fact, for it is an inquiry based on a foundation of the probative facts.

*Dennison Mfg. Co.*, 810 F.2d 1593, 1595-96 (Fed. Cir. 1986).

## Obviousness.

PTO has not established a showing of obviousness. He contends that the combination applied by the Board and improperly combined, using suggestion, without evidence to support the combination and in the face of the teachings in the prior art. He argued that the claims were rejected because they would have been obvious over the claimed invention, and this is for rejection.

The PTO has the burden to establish a *prima facie* case. See *In re Piasecki*, 745 F.2d 223, 223 USPQ 785, 787-87 (Fed. Cir. 1984). It can satisfy this burden by showing some objective teaching in the prior art that knowledge generally of ordinary skill in the art would be expected to combine the teachings of the references. *In re* 703, 705, 223 USPQ 1257, 984; see also *Ashland Oil, Refractories, Inc.*,

776 F.2d 281, 297 n.24, 227 USPQ 657, 667 n.24 (Fed. Cir. 1985); *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). This it has not done. The Board points to nothing in the cited references, either alone or in combination, suggesting or teaching Fine's invention.

The primary basis for the Board's affirmation of the Examiner's rejection was that it would have been obvious to substitute the Warnick nitric oxide detector for the Eads sulfur dioxide detector in the Eads system. The Board reiterated the Examiner's bald assertion that "substitution of one type of detector for another in the system of Eads would have been within the skill of the art," but neither of them offered any support for or explanation of this conclusion.

Eads is limited to the analysis of sulfur compounds. The particular problem addressed there is the difficulty of obtaining precise measurements of sulfur compounds because of the tendency of sulfur dioxide to adhere to or react with the sampling analytic equipment or the liquid or gaseous materials in the equipment. It solves this problem by suggesting that the gaseous sample containing sulfur compounds be absorbed into sulfur-free methanol and then inserted into a gas chromatograph to separate the sulfur compounds.

There is no suggestion in Eads, which focuses on the unique difficulties inherent in the measurement of sulfur, to use that arrangement to detect nitrogen compounds. In fact, Eads says that the presence of nitrogen is undesirable because the concentration of the titration cell components in the sulfur detector is adversely affected by substantial amounts of nitrogen compounds in the sample. So, instead of suggesting that the system be used to detect nitrogen compounds, Eads deliberately seeks to avoid them; it warns against rather than teaches Fine's invention. See *W. L. Gore & Assoc. v. Garlock, Inc.*, 721 F.2d 1540, 1550, 220 USPQ 303, 311 (Fed. Cir. 1983) (error to find obviousness where references "diverge from and teach away from the invention at hand"). In the face of this, one skilled in the art would not be expected to combine a nitrogen-related detector with the Eads system. Accordingly, there is no suggestion to combine Eads and Warnick.

Likewise, the teachings of Warnick are inconsistent with the claimed invention, to some extent. The Warnick claims are directed to a gas stream from engine exhaust "continuously flowing the gaseous mixtures into the reaction chamber" to obtain "con-

tinuous readouts" of the amount of nitric oxide in the sample. The other words, it contemplates measuring the total amount of nitric oxide in a continuously flowing gaseous mixture of unseparated nitrogen constituents. By contrast, in Fine each nitrogen compound constituent of the gaseous sample is retained in the Chromatograph for an individual time period so that each exists in discrete, time-separated pulses.\* By this process, each constituent may be both identified by its position in time sequence, and measured. The claimed system, therefore, diverges from Warnick and teaches advantages not appreciated or contemplated by it.

Because neither Warnick nor Eads, alone or in combination, suggests the claimed invention, the Board erred in affirming the Examiner's conclusion that it would have been obvious to substitute the Warnick nitric oxide detector for the Eads sulfur dioxide detector in the Eads system. *ACS Hosp. Sys.*, 732 F.2d at 1575-77, 221 USPQ at 931-33. The Eads and Warnick references disclose, at most, that one skilled in the art might find it obvious to try the claimed invention. But whether a particular combination might be "obvious to try" is not a legitimate test of patentability. *In re Geiger*, 815 F.2d 868, 688, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987); *In re Goodwin*, 576 F.2d 375, 377, 198 USPQ 1, 3 (CCPA 1978).

[2] Obviousness is tested by "what the combined teachings of the references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). But it "cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination." *ACS Hosp. Sys.*, 732 F.2d at 1577, 221 USPQ at 933. And "teachings of references can be combined only if there is some suggestion or incentive to do so." *Id.* Here, the prior art contains none.

Instead, the Examiner relies on hindsight in reaching his obviousness determination.

\* The Solicitor argues that the contents of Attachment C of Fine's brief were not before the Board and may not properly be considered here. However, we need not rely on Attachment C. It is merely illustrative of the qualitative separation of nitrogen compounds which occurs in Fine's system. The fact that the various constituents exit at discrete intervals is shown by the specification which was before the Board and which may appropriately be considered on appeal. See, e.g., *Astra-Sjuco, A.B. v. United States Int'l Trade Comm'n*, 629 F.2d 682, 686, 207 USPQ 1, 5 (CCPA 1980) (claims must be construed in light of specification).

But this court has said, "To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." *W.L. Gore*, 721 F.2d at 1553, 220 USPQ at 312-13. It is essential that "the decisionmaker forget what he or she has been taught at trial about the claimed invention and cast the mind back to the time the invention was made ... to occupy the mind of one skilled in the art who is presented only with the references, and who is normally guided by the then-accepted wisdom in the art." *Id.* One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

**C. Advantage Not Appreciated by the Prior Art.**

[3] The Board erred not only in improperly combining the Eads and Warnick references but also in failing to appreciate that the appealed claims can be distinguished over that combination. A material limitation of the claimed system is that the conversion of nitric oxide occurs in the range of 600°C to 1700°C. The purpose of this limitation is to prevent nitrogen from other sources, such as the air, from being converted to nitric oxide and thereby distorting the measurement of nitric oxide derived from the nitrogen compounds of the sample.

The claimed nitric oxide conversion temperature is not disclosed in Warnick. Although Eads describes a preferred temperature of 675°C to 725°C, the purpose of this range is different from that of Fine. Eads requires the 675°C to 725°C range because it affords a temperature low enough to avoid formation of unwanted sulfur trioxide, yet high enough to avoid formation of unwanted sulfides. Fine's temperature range, in contrast, does not seek to avoid the formation of sulfur compounds or even nitrogen compounds. It enables the system to break down the nitrogen compounds of the sample while avoiding the destruction of background nitrogen gas. There is a partial overlap, of course, but this is mere happenstance. Because the purposes of the two temperature ranges are entirely unrelated, Eads does not teach use of the claimed range. See *In re Geiger*, 815 F.2d at 688, 2 USPQ2d at 1278. The Board erred by concluding otherwise.

**D. Unexpected Results.**

Because we reverse for failure to establish a *prima facie* case of obviousness, we need not reach Fine's contention that the Board

failed to accord proper weight to the objective evidence of unexpected superior results. *Id.*

**E. The "Flame" Claims.**

[4] Claims 62, 68, 69, 79, 85 and 86 relate to the oxygen-rich flame conversion means of the claimed invention. These "flame" claims depend from either apparatus claim 60 or method claim 77. Dependent claims are non-obvious under section 103 if the independent claims from which they depend are nonobvious. *Hartness Int'l, Inc. v. Simplimatic Eng'g Co.*, 819 F.2d 1100, 1108, 2 USPQ2d 1826, 1831 (Fed. Cir. 1987); *In re Abele*, 684 F.2d 902, 910, 214 USPQ 682, 689 (CCPA 1982); see also *In re Sernaker*, 702 F.2d 989, 991, 217 USPQ 1, 3 (Fed. Cir. 1983). In view of our conclusion that claims 60 and 77 are nonobvious, the dependent "flame" claims are also patentable.

**Conclusion**

The Board's decision affirming the Examiner's rejection of claims 60, 62, 63, 68, 69, 77, 79, 80, 85 and 86 of Fine's application as unpatentable over the prior art under 35 U.S.C. §103 is **REVERSED**.

**Smith, circuit judge, dissenting.**

I respectfully dissent. I am of the firm belief that the prior art references, relied upon by the PTO to establish its *prima facie* case of obviousness, in combination teach and suggest Fine's invention to one skilled in the art. Also, I firmly believe that Fine failed to rebut the PTO's *prima facie* case. On this basis, I would affirm the board's determination sustaining the examiner's rejection, pursuant to 35 U.S.C. §103, of Fine's claims on appeal before this court.

**Court of Appeals, Federal Circuit**

Advance Transformer Co. v. Levinson

No. 87-1011

Decided January 28, 1988

**PATENTS**

**1. Infringement — Construction of claims (§115.03)**

**Patent construction — Patent Office proceedings (§125.05)**

**Patent construction — Prosecution history estoppel (§125.09)**

Federal district court, in action for declaration of non-infringement of patent, proper-

**Court of Customs and Patent Appeals**

In re Ehrreich and Avery

No. 78-561

Decided Jan. 11, 1979

**PATENTS****1. Claims — Indefinite — In general (§20.551)****Claims — Specification must support (§20.85)****Specification — Sufficiency of disclosure (§62.7)**

Second paragraph of 35 U.S.C. 112 pertains only to claims; agreement, or lack thereof, between claims and specification is properly considered only with respect to first paragraph of Section 112, and is irrelevant to compliance with second paragraph of that section.

**2. Claims — Specification must support (§20.85)**

35 U.S.C. 112 does not permit examiner to study applicants' disclosure, formulate conclusion as to what examiner regards as broadest invention supported by disclosure, and then determine whether claims are broader than examiner's conception of what "the invention" is.

**3. Claims — Indefinite — In general (§20.551)****Claims — Specification must support (§20.85)****Specification — Sufficiency of disclosure (§62.7)**

First sentence of second paragraph of 35 U.S.C. 112 is essentially requirement for precision and definiteness in claim language; if scope of subject matter embraced in claim is clear, and if applicant has not otherwise indicated that he intends claim to be of different scope, claim does particularly point out and distinctly claim subject matter that applicant regards as his invention, that is, if "enabling" disclosure of specification is not commensurate in scope with subject matter encompassed by claim, that fact does not render claim imprecise or indefinite or otherwise not in compliance with second paragraph of Section 112; claim that is of such breadth that it reads on subject matter as to which specification is not enabling should be rejected under Section 112, first paragraph.

**4. Claims — Broad or narrow — In general (§20.201)****Patentability — Anticipation — In general (§51.201)****Pleading and practice in Patent Office — Rejections (§54.7)**

Claim that is of such breadth that it reads on subject matter disclosed in prior art is rejected under 35 U.S.C. 102 rather than under second paragraph of Section 112; Section 112 rejections need not be labeled "first paragraph" or second paragraph" although it should be made clear exactly which Section 112 requirement is thought not to have been met.

**5. Pleading and practice in Patent Office — Rejections (§54.7)**

Rejection not based on indefiniteness or lack of clarity of claim language, but only on alleged lack of agreement with scope of specification is treated as one made only under first paragraph of 35 U.S.C. 112.

**6. Construction of specification and claims — Broad or narrow — In general (§22.101)****Construction of specification and claims — By specification and drawings — In general (§22.251)**

Claim language is to be given its broadest reasonable interpretation in light of specification.

**7. Patentability — Anticipation — Combining references (§51.205)**

Reference must not be considered in vacuum, but against background of other references of record that may disprove theories and speculations in reference, or reveal previously undiscovered or unappreciated problems; question in 35 U.S.C. 103 case is what references would collectively suggest to one of ordinary skill in art, and it is only by proceeding in this manner that scope and content of prior art may be fairly determined according to mandate of *Graham v. John Deere Co.*, 148 USPQ 459.

**8. Patentability — Anticipation — Combining references (§51.205)****Patentability — Invention — In general (§51.501)**

Patentability issue must be approached in terms of what would have been obvious to one of ordinary skill in art at time invention was made in view of sum of all relevant teachings in art, not in view of first one and then another of isolated teachings in art; entirety of disclosure made by references, must be considered and combining them indiscriminately must be avoided.

# **ability — Anticipation — In general (§51.201)**

## **ing and practice in Patent Office Rejections (§54.7)**

that is of such breadth that it reads out matter disclosed in prior art is under 35 U.S.C. 102 rather than under paragraph of Section 112; Second, rejections need not be labeled "first paragraph" or "second paragraph" although it should be made clear exactly which Section requirement is thought not to have been met.

## **ing and practice in Patent Office Rejections (§54.7)**

rejection not based on indefiniteness or vagueness of claim language, but only on lack of agreement with scope of prior art is treated as one made only under paragraph of 35 U.S.C. 112.

## **struction of specification and claims — Broad or narrow — In general (§22.101)**

## **struction of specification and claims — By specification and drawings — In general (§22.251)**

claim language is to be given its broadest reasonable interpretation in light of the prior art.

## **ability — Anticipation — Combining references (§51.205)**

rejection must not be considered in isolation but against background of other prior art of record that may disprove or confirm and speculations in reference, or previously undiscovered or unappreciated problems; question in 35 U.S.C. 103 is what references would collectively teach to one of ordinary skill in art, and by proceeding in this manner that the content of prior art may be fairly read according to mandate of *Ex parte John Deere Co.*, 148 USPQ 459.

## **ability — Anticipation — Combining references (§51.205)**

## **ability — Invention — In general (§51.501)**

patentability issue must be approached in light of what would have been obvious to one of ordinary skill in art at time invention was made in view of sum of all relevant prior art, not in view of first one and not in view of isolated teachings in art; enclosure made by references, must be considered and combining them in a new way must be avoided.

## **9. Claims — Introductory phrase (§20.60)**

Preamble elements in Jepson-type claim are impliedly admitted to be old in art.

## **10. Patentability — Invention — In general (§51.501)**

Finding of obviousness should not be based on implied admission erroneously creating imaginary prior art; this is not purpose of 35 U.S.C. 103.

## **Particular patents — Conductive Plastics**

3,583,930, Ehrreich and Avery, Plastics Made Conductive With Coarse Metal Fillers, rejection of claims 1-45 of reissue application reversed.

Appeal from Patent and Trademark Office Board of Appeals.

Application for reissue of patent of John E. Ehrreich and Donald Avery, Serial No. 379,784, filed July 16, 1973, to reissue Patent No. 3,583,930, issued June 8, 1971. From decision rejecting claims 1-45, applicants appeal. Reversed; Baldwin, Judge, concurring, with opinion.

David G. Conlin, Sewall P. Bronstein, Donald Brown, and Dike, Bronstein, Roberts, Cushman & Pfund, all of Boston, Mass., for appellants.

Joseph F. Nakamura (William H. Beha, Jr., of counsel) for Commissioner of Patents and Trademarks.

Before Markey, Chief Judge, and Rich, Baldwin, Lane, and Miller, Associate Judges.

Rich, Judge.

This appeal is from the decision of the Patent and Trademark Office (PTO) Board of Appeals (board) affirming the rejection of claims 1-45, all of the claims in application serial No. 379,784, filed July 16, 1973, for reissue of U.S. Patent No. 3,583,930, entitled "Plastics Made Conductive With Coarse Metal Fillers." The board affirmed the examiner's rejection of all claims as obvious under 35 USC 103. In addition, the examiner's rejection of claims 1-8, 12-24, 26-31, 33-36, 38-43, and 45 under 35 USC 112 was sustained by the board. We reverse.

## **The Invention**

Appellants' invention pertains to improved electrically-conductive coatings, gaskets, and caulking compounds useful for

waveguide assemblies, weathertight R.F. (radio frequency) enclosures, and other applications requiring environmental sealing and electromagnetic radiation (EMR) shielding. A compressible or resilient plastic material is loaded with silver-coated metal particles which are held in electrically-conductive, metal-to-metal contact by the plastic binder or matrix. Appellants' improvement resides in their discovery that high-volume loadings of the plastic material, in the order of 35 to 80 volume percent, utilizing large particles (0.5 to 40 mils) having a high surface area per unit volume, i.e., between 450 to 200,000 square feet/cubic foot, results in a product having high conductivity, and, hence, good EMR shielding capability. The invention may be better understood from an examination of claims 1, 9, and 12, the only independent appealed claims. Claim 12 is the broadest claim:

12. In an electromagnetic energy shield having a volume resistivity to be effective as an electromagnetic shield comprising a resin matrix loaded with particles coated with silver in an amount of about 40 to 80 volume percent, the improvement being that the silver coated particles are of a maximum size in the range of from 0.5 to 40 mils and wherein the resin is [sic] compressible.

Claim 1 is the same except for being limited to an EMR shield "in the form of a gasket or caulking compound." Claim 9 is limited to an EMR shield in the form of a gasket wherein the particles are spherical:

9. An electromagnetic energy shield in the form of a gasket having a volume resistivity to be effective as an electromagnetic energy shield comprising a compressible resin matrix loaded with substantially spherical particles coated with a layer of silver and ranging in size from 0.5 to 40 mils.

## **The Prior Art**

The following references were cited by the examiner and relied on in various combinations to support the rejection of the claims under §103:

Wood	2,313,379	March 9, 1943
McGrath	2,506,728	May 9, 1950
Coleman et al.	2,771,380	Nov. 20, 1956
Price	3,030,237	April 17, 1962
Ueda	3,083,169	March 26, 1963
Hunter	3,099,578	July 30, 1963
Cuning, W. R.	"Materials for R. F. Shielded Chambers and Enclosures," Symposium Digest, 4th National Symposium on Radio Frequency Interference, June 28-29, 1962.	

Ueda discloses thermally and electrically conductive plastics made by mixing a water-soluble phenolic resin with ultra-fine (approximately 0.1m) powders of carbon in combination with similarly sized powders of various metals. His normally hard product may be made flexible by the addition of polyvinyl alcohol to the phenolic resin mixture. Ueda states that the superior conductivity of his composition is due largely to the presence of the water in the phenolic mixture. In that way, Ueda claims to overcome the prior art dilemma of how to increase conductivity without adverse effect on mechanical properties caused by addition of too large a proportion of conductive particles in the compositions. Otherwise, he is silent as to the amount of powdered mixture to be added to the resin.

Hunter discloses an electrically conductive, heat-producing coating composition made from finely powdered (particle size less than 4 mils) conductive substances, viz., carbon, silver, iron, in combination with a flexible resin, wherein the concentration of the powdered conductive component is between 22-53% by volume. It is disclosed as having a resistance sufficient to enable its use as a heating element. Hunter teaches that a mixture of finely powdered carbon, granular silver, and granular iron particles must be used, and that the granule form of metal particles is superior to the flake form. In Example X, Hunter teaches that when the concentration exceeds 53% the coating becomes deficient in mechanical properties such as adherence and flexibility.

Coleman et al. disclose a method of coating copper particles with silver. The particles to be coated may be as large as 40 mils, and Coleman et al. state that such particles may be used in applications calling for electrically-conductive compositions or paints. The disclosure is not limited to any particular particle shape.

Wood discloses a thermally and electrically conductive sponge rubber composition, used as a heat dissipator or electrostatic shield, in a mounting for electrical components. Particles, preferably in "fine dust" form (no size range is specified), are added to the sponge rubber in an amount determined by the degree of conductivity desired. Wood states that there is "no definite upper limit" to the amount of conductive material which may be added to the rubber and suggests he may use "50% or even more" but discloses no more than 20% by weight of powdered aluminum in any composition which he has "used successfully."

Price discloses the use of substantially spherical particles of gold, silver, copper, or aluminum in combination with flake-type particles of the same materials in conductive resinous coatings. The maximum particle size taught is approximately 44 microns, and Price directs that specified portions of the two different shapes of particles must be used to achieve the desired result.

McGrath discloses a conductive sealing compound for metal joints which sets or vulcanizes when the surfaces to which it has been applied are heated by spot-welding. The compound is made conductive by inclusion of iron or copper filings, carbon black, and the like. The vulcanized composition forms a substantially gas and liquid-imperious seam or joint.

Symposium Digest disclosures that silver-coated particles can be added to plastic binders to make gaskets and caulking compounds with good R.F. shielding properties. Only the use of "finely divided" particles (size unspecified) is discussed, and no ingredient portions are given.

#### The Rejections

#### 35 USC 112

Appellants' problems under §112 stem from the language in claims 1 and 12 which define the particle size as being "of a maximum size in the range of from 0.5 to 40 mils." The board agreed with the examiner that this language defined only the largest particles and did not define the lower limit of particle size. Although the board opinion is not explicit, we read it as affirming the examiner's rejection under both paragraphs 1 and 2 of §112.<sup>1</sup> Since the specification discloses the necessity of using coarse particles, this interpretation of the language of claims 1 and 12 causes the specification to be at variance with the claims, resulting in the rejection under paragraph 2 of §112 as not being what applicants regard as their invention. In addition, this language makes the claims read on the ultra-fine prior art particles and results in a rejection under paragraph 1 of §112 as broader than the specification — i.e., lacking support therein.

<sup>1</sup> The board stated:

The specification clearly sets a lower and upper limit for the suitable particle size. The claims before us read on particles having a size less than 0.5 mils and accordingly, do not claim what appellants regard as their invention and are broader than the specification. [Emphasis ours.]

The emphasized portion of the board's statement effectively sets out rejections under both paragraphs 1 and 2 of §112.

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## 35 USC 103

The rejections under 35 USC 103 were made by considering the claims in three groups. The group I claims, drawn to a shield in the form of a gasket or caulking compound, comprising claims 1-3, 7, 12-15, 17, 21-22, 25, 30-31, 33-36, 39, 41, and 45, were rejected as obvious from Ueda or Hunter in view of Coleman et al. and Wood. The examiner reasoned that, in view of the teachings of Ueda and Hunter that electrically-conductive plastic materials could be made from silver particles:

It would be obvious to replace the silver particles of Ueda or Hunter with silver coated copper particles since Coleman et al., teaches [sic] using such particles in conductive compositions and that such compositions will have superior conductivity. Wood teaches [sic] that when metal particles are dispersed in rubber there is no upper limit on the amount of metal that can be added, the amount chosen depending on the conductivity desired. In view of Wood it would be obvious to one skilled in the art to choose a volume percent depending on the conductivity desired.

The group I claims were also found obvious from Symposium Digest in view of Wood. The examiner's rejection was simply stated in these words:

5. Claims 1-3, 7, 12-15, 17, 21-22, 25, 30-31, 33-36, 39, 41 and 45 are rejected as being unpatentable over Symposium Digest in view of Wood under 35 U.S.C. 103. Symposium Digest discloses that silver coated copper particles can be added to plastic to make either a gasket or caulking compound with good R.F. shielding properties. Wood teaches that in adding metal particles to rubber there is no upper limit on the percent added, the amount added depending on the conductivity desired. In view of Wood [it would be] obvious to choose the volume percent as desired.

The group II claims, drawn to compositions utilizing spherical particles, were rejected as obvious from Ueda or Hunter in view of Coleman et al. and Wood for the same reasons given for the group I claims, and further in view of Price, who teaches use of spherical silver particles. According to the examiner:

3. Claims 4-6, 8-11, 16, 18-20, 23-24, 26-29, 32, 37-38, 40, 42-44 are rejected as being unpatentable over either Ueda or Hunter in view of Coleman and Wood for

the same reason as stated \* \* \* [above] and further in view of Price under 35 U.S.C. 103. In a conductive coating Price teaches that silver particles can be used in the form of spheres. See column 1, lines 1-2, 59-61; column 2, line 9. In view of Price it would be obvious to use spheres as Coleman et al.'s particles.

Applicant's [sic] arguments with respect to Price are not at issue since it is solely being used to teach a particular particle shape.

In addition, the group II claims were rejected as obvious from Symposium Digest in view of Wood and further in view of Price for the same reasons as stated above.

The group III claims, drawn to compositions using spherical particles and formed into gaskets, comprising claims 9-11, 25-29, 37, and 43, were rejected as obvious from Ueda or Hunter in view of Coleman et al., Wood, and Price, for the same reasons as stated above, and further in view of McGrath, who teaches that conductive compositions comprising metal particles and resin can be formed into compressible gaskets.

In agreeing with the examiner, the board merely adopted the reasons of the examiner as its own after commenting further on the significance of the primary references. It was noted that while not all of the references discuss the EMR shielding capabilities of the disclosed compositions, those capabilities would be inherently expected of such compositions. Appellants were criticized for arguing the references separately rather than collectively, as used in the rejections, for what they would suggest to those of ordinary skill in the art.

### Opinion

#### The §112 Rejections

Preliminarily, we note that the rejection under the second paragraph of §112 is predicated on a comparison of the claims with the specification. The examiner and the board held that since, in their opinion, the claims did not recite the lower particle size limit which the specification disclosed as critical to the invention, appellants had failed to particularly point out and distinctly claim the subject matter they regarded as their invention.<sup>2</sup> We cannot accept this reasoning.

<sup>2</sup> The examiner stated in his final rejection:

(B) Claims 1-45 are rejected as failing to particularly point out and distinctly claim what

discloses the use of substantially equal particles of gold, silver, copper, or aluminum in combination with flake-type particles of the same materials in conductive coatings. The maximum particle diameter is approximately 44 microns, and the size directs that specified portions of particles must be of different shapes of particles must be used to achieve the desired result.

McGrath discloses a conductive sealing compound for metal joints which sets or cures when the surfaces to which it has been applied are heated by spot-welding. The compound is made conductive by including iron or copper filings, carbon black, or the like. The vulcanized composition is a substantially gas and liquid-impermeable joint.

Symposium Digest discloses that silver particles can be added to plastic to make gaskets and caulking compounds with good R.F. shielding properties. The use of "finely divided" particles (unspecified) is discussed, and no particle portions are given.

### Rejections

#### 35 USC 112

Appellants' problems under §112 stem from the language in claims 1 and 12 which recite the particle size as being "of a maximum size in the range of from 0.5 to 40 microns." The board agreed with the examiner that this language defined only the largest particle size and did not define the lower limit particle size. Although the board opinion is explicit, we read it as affirming the examiner's rejection under both paragraphs 1 and 2 of §112.<sup>1</sup> Since the specification discloses the necessity of using coarse particles, the interpretation of the language of claims 1 and 12 causes the specification to be at odds with the claims, resulting in the rejection under paragraph 2 of §112 as not being supported by the specification. In addition, this language makes the claims read on the ultra-fine prior art and results in a rejection under paragraph 1 of §112 as broader than the specification — i.e., lacking support therein.

The board stated:

The specification clearly sets a lower and upper limit for the suitable particle size. The claims recite that we read on particles having a size less than 0.5 microns and accordingly, do not claim what is recited in the specification. [Emphasis ours.]

The emphasized portion of the board's statement clearly sets out rejections under both paragraphs 1 and 2 of §112.



[1, 2, 3, 4] The second paragraph of §112 pertains *only* to claims. In re Borkowski, 57 CCPA 946, 951, 422 F.2d 904, 909, 164 USPQ 642, 645 (1970). Agreement, or lack thereof, between the claims and the specification is properly considered only with respect to the first paragraph of §112; it is irrelevant to compliance with the second paragraph of that section. The PTO approach to the §112 rejection in this case is strikingly similar to the approach taken by the examiner in Borkowski, *supra*, which we disapproved. As we said in Borkowski (57 CCPA at 952, 422 F.2d at 909, 164 USPQ at 645-646):

The examiner's approach to determining whether appellants' claims satisfy the requirements of §112 appears to have been to study appellants' disclosure, to formulate a conclusion as to what he (the examiner) regards as the broadest invention supported by the disclosure, and then to determine whether appellants' claims are broader than the examiner's conception of what "the invention" is. We cannot agree that §112 permits of such an approach to claims. The first sentence of the second paragraph of §112 is essentially a requirement for *precision and definiteness* of claim language. If the scope of subject matter embraced by a claim is clear, and if the applicant has not otherwise indicated that he intends the claim to be of a different scope, then the claim does particularly point out and distinctly claim the subject matter which the applicant regards as his invention. That is to say, if the "enabling" disclosure of a specification is not commensurate in scope with the subject matter encompassed by a claim, that fact does not render the claim imprecise or indefinite or otherwise not in compliance with the *second* paragraph of §112; rather, the claim is based on an *insufficient disclosure* (§112, first paragraph) and should be rejected on that ground. \* \* \* [citations] Thus, just as a claim

applicants regard as their invention under 35 U.S.C. 112 (paragraph 2). At pages 3 and 4 of the specification, applicants cite prior art use of finely divided particles and state that the instant invention lies in the use of coarse particles (which by definition are large particles). See also page 13, example 3. As such, since claim 1 is readable on very fine particles (i.e. no minimum size), it does not define what applicants regard as their invention. The claim merely states a maximum size range from 0.5 to 40 mils but there is no inclusion of a minimum size range.

For the board's reasoning, see note 1, *supra*.

which is of such breadth that it reads on subject matter disclosed in the prior art is rejected under §102 rather than under the second paragraph of §112, a claim which is of such breadth that it reads on subject matter as to which the specification is not "enabling" should be rejected under the first paragraph of §112 rather than the second. We do not intend hereby to suggest that rejections under §112 must be labeled "first paragraph" or "second paragraph." What we do suggest is that it should be made clear exactly which of the several requirements of §112 are thought not to have been met. Is the claim unclear or is the specification's disclosure inadequate to support it? [Emphasis in original; footnotes omitted.]

[5] Since this rejection is not based on indefiniteness or lack of clarity of claim language, but only on the alleged lack of agreement with the scope of the specification, we reverse it as having been improperly made. We therefore treat the rejection under §112 as one made only under the first paragraph thereof. We will not sustain it.

Because we read the claims as setting forth a minimum particle size limitation, we hold that the examiner and the board erred in finding no such limitation recited. There are several reasons for our conclusion.

[6] Claim language is to be given its broadest reasonable interpretation in light of the specification. In re Okuzawa, 537 F.2d 545, 548, 190 USPQ 464, 466 (CCPA 1976); In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). The limitation at issue requires that "the silver coated particles are of a maximum size in the range of from 0.5 to 40 mils." The examiner and the board noted that the specification explicitly teaches the necessity of using coarse particles to make the compositions, and clearly states that the minimum particle size used is 0.5 mil. Both, however, interpreted the words "maximum size in the range of 0.5 to 40 mils" to mean that the largest of the particles should be in the range recited and concluded that no lower limit for particle size was recited.

We think it highly unlikely that one skilled in the art would construe the term "maximum size" as used in this context in the manner suggested by the PTO. Appellants have brought to our attention that the very art cited by the PTO in making the §103 rejections makes clear that those skilled in the art routinely measure the sizes of irregularly-shaped particles, to which the rejected claims are drawn, by reference to

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is of such breadth that it reads on matter disclosed in the prior art is under §102 rather than under the paragraph of §112, a claim which ch breadth that it reads on subject as to which the specification is not "ing" should be rejected under the paragraph of §112 rather than the se. We do not intend hereby to suggest rejections under §112 must be labeled "first paragraph" or "second ph." What we do suggest is that it be made clear exactly which of the requirements of §112 are thought have been met. Is the claim unclear e specification's disclosure inadequate to support it? [Emphasis in ; footnotes omitted.]

ze this rejection is not based on in- is or lack of clarity of claim but only on the alleged lack of with the scope of the specifica- verse it as having been improperly therefore treat the rejection under one made only under the first thereof. We will not sustain it. we read the claims as setting imum particle size limitation, we he examiner and the board erred no such limitation recited. There reasons for our conclusion.

m language is to be given its easonable interpretation in light fication. In re Okuzawa, 537 48, 190 USPQ 464, 466 (CCPA re Royka, 490 F.2d 981, 180 (CCPA 1974). The limitation at res that "the silver coated par- a maximum size in the range of 40 mils." The examiner and the d that the specification explicitly necessity of using coarse par- ke the compositions, and clearly he minimum particle size used is oth, however, interpreted the imum size in the range of 0.5 to mean that the largest of the par- be in the range recited and con- no lower limit for particle size

it highly unlikely that one skill- would construe the term "max- as used in this context in the ested by the PTO. Appellants t to our attention that the very he PTO in making the §103 re- es clear that those skilled in the ely measure the sizes of aped particles, to which the ns are drawn, by reference to

the particle's largest dimension.<sup>3</sup> In our opi- nion, one skilled in the art having the specification in mind would read the claim language as defining both an upper and lower limit on particle size. The specifica- tion explicitly states that the preferable *max- imum particle size* is 40 mils and that the *minimum particle size* used is 0.5 mil. These same values are used in the claims, which recite a size *range* — a concept which most readily makes sense, especially in light of the specification, if viewed as setting forth *both* an *upper* and a *lower* limit.<sup>4</sup>

In addition, the PTO, with respect to identical language in the original claims for which reissue is sought here, refused a re- quest for a certificate of correction which had been sought to remove the word "max- imum" from the claims. The request was denied on the recommendation of the Group Director, who stated:

The proposed change would materially affect the scope of the claims. *The term "maximum" is used with the term "size" and refers [sic] to the maximum dimension of an irregularly shaped particle.* Applicant points out that maximum was not used in claim 9 but in claim 9 the particle was defined as "substantially spherical" [sic]. [Emphasis ours.]

Thus the PTO has led appellants to believe that their claim language would be given a particular construction by refusing to allow them to remove the very word which it now asserts renders the claims fatally deficient under §112. The solicitor argues that appellants' construction of the claims at

<sup>3</sup> Price states:

First, I find that the *size or maximum dimension* of all pigment particles should be approximately 44 microns (0.0017") \* \* \*. [Emphasis ours.]

Hunter states:

\* \* \* the granules should be less than about 100 microns in *maximum dimension* and preferably smaller. [Emphasis ours.]

Coleman states:

The method has been used with success with particles which range in size from about one millimeter to a few microns in their *maximum dimension*. [Emphasis ours.]

<sup>4</sup> One skilled in the art, with knowledge of the technique for measuring irregularly-shaped particles, would interpret the term "maximum size" as recited in the claims to relate to the measure- ment technique, and would apply it to define an upper and lower limit for particle size. Viewed in this light, the claims call for the particles to have a maximum "maximum dimension" of 40 mils and a minimum "maximum dimension" of 0.5 mil.

issue under §112 would literally read out the word "maximum." He contends that appellants had ample time during prosecu- tion to amend their claims to remove the word but chose not to do so, and now must take the claims as they now read. We agree that appellants must take their claims as they now read, but we are of the opinion that appellants' interpretation of the claims is the more reasonable. Appellants had no reason to wish to amend their claims until the PTO changed its mind regarding inter- pretation of appellants' claim language. Therefore, the decision of the board affirm- ing the rejection under 35 USC 112 of claims 1-8, 12-24, 26-31, 33-36, 38-43, and 45 is reversed.

*The §103 Rejections*

[7] We will reverse all of the rejections under §103 based upon Symposium Digest combined with Wood. As noted by the board, Symposium Digest "describes silver coated copper particles which may be used to form coatings, gaskets or caulking compositions. Symposium does not define the size of the particles and does not describe the ratio of particles compared to binder." (Emphasis ours.) By disclosing that the metal is preferably in the form of a "fine dust," Wood teaches away from the claimed particle size. What Wood does disclose is that he had successfully used compositions including 20% *aluminum by weight*. When it is considered that the claim- ed *silver-coated particles* are heavier than *aluminum particles*,<sup>5</sup> and that the *weight percent* disclosed by Wood becomes a smaller *volume percent* than that recited in the claims, we agree with appellants that Wood does not teach appellants' volume loadings. Further- more, we regard Wood's statements that proportions by weight-percent of "50% or even more may be used," and that "there is no definite upper limit for the powdered metal filler," as pure speculation which would be ignored by those skilled in the art in view of the later teachings of Ueda and Hunter that high particle loadings have a deleterious effect on the mechanical properties of the compositions and are to be avoided. Cf. In re Oelrich, 579 F.2d 86, 91, 198 USPQ 210, 214 (CCPA 1978). We must not here con- sider a reference in a vacuum, but against the background of the other references of

<sup>5</sup> Appellants disclose the use of nickel, lead, zinc, cadmium, and copper particles. Volume for volume, all of these particles are heavier than aluminum particles by virtue of their greater atomic weight.

record which may disprove theories and speculations in the reference, or reveal previously undiscovered or unappreciated problems. The question in a §103 case is what the references would collectively suggest to one of ordinary skill in the art. In re Simon, 461 F.2d 1387, 174 USPQ 114 (CCPA 1972). It is only by proceeding in this manner that we may fairly determine the scope and content of the prior art according to the mandate of *Graham v. John Deere Co.* 383 U.S. 1, 17, 148 USPQ 459, 467 (1966). Therefore, combination of Symposium Digest with Wood would not have rendered obvious the particle size limitation or the particle volume-percent limitation, and certainly not the subject matter as a whole which encompasses these limitations. Cf. In re Hirao, 535 F.2d 67, 69, 190 USPQ 15, 17 (CCPA 1976); In re Prater, 56 CCPA 1381, 415 F.2d 1393, 162 USPQ 541 (1969).

[8] Our review of the record also convinces us that the prior art relied upon by the examiner and the board does not support a holding of obviousness under §103 using the proposed art combinations to reject the group 1 claims. As we stated in In re Kuderna, 57 CCPA 1078, 426 F.2d 385, 165 USPQ 575, 578-579 (1970):

We must approach the issue of patentability in terms of what would have been obvious to one of ordinary skill in the art at the time the invention was made in view of the sum of all the relevant teachings in the art, not in view of first one and then another of the isolated teachings in the art.

We must consider the entirety of the disclosure made by the references, and avoid combining them indiscriminately. In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976).

The rejections all rely on the crucial combination of Ueda or Hunter with Wood. As we have explained, we do not accept the speculations of Wood regarding the unlimited volume loadings. We are of the opinion that, when taken in their entireties, Ueda or Hunter, in combination with Wood, do not suggest the claimed compositions.

The board has noted that Ueda fails to teach the claimed particle size, volume loadings, or use of silver-coated particles. Although it may be argued that Hunter may be used to teach appellants' claimed volume loadings,<sup>6</sup> we decline to apply it in this

<sup>6</sup> In his brief, the solicitor notes that Hunter does disclose conductive particles "in volume con-

manner. Neither the examiner nor the board, having Hunter before them, suggested that the reference teaches this limitation, relying instead solely on Wood. Hunter's concern with providing a fixed resistance property in his compositions, and his warning that the "definite relationship between the proportions of binder and each of the three particulate materials \* \* \* must be observed" (emphasis added) in order to provide mechanically-stable coating compositions possessing, inter alia, the property of flexibility, would, we think, have prevented one of ordinary skill in the art from finding any suggestion in Hunter that a single type of conductive particle could be included in the claimed volume concentrations to form a composition having a high enough conductivity (low enough volume resistivity) "to be effective as an electromagnetic shield." In this respect, appellants are addressing a different problem than did Hunter, a factor which must be considered in evaluation of Hunter as a reference. Thus, the subject matter as a whole would not have been obvious from the references. In re Hirao and In re Prater, supra.

[9, 10] The solicitor has noted that claims 1 and 12 are in Jepson format (Ex parte Jepson, 1917 C.D. 62, 243 O.G. 526) and asserts that appellants impliedly admit that the subject matter recited in combination in the preamble (i.e., up to "the improvement being") is old in the art. We agree that the preamble elements in a Jepson-type claim are impliedly admitted to be old in the art, 37 CFR 1.75(e) (1978); see also In re Aldrich, 55 CCPA 1431, 1434, 398 F.2d 855, 857, 158 USPQ 311, 312 (1968), but it is only an implied admission. The fact that none of the art cited by the examiner shows the combination recited in the claim-preambles gives credence to appellants' explanation for drafting the claims in Jepson format, which was not intended as an admission, but was to avoid a double patenting rejection in a co-pending case unavailable to the public. We think that a finding of obviousness should not be based on an implied admission erroneously creating imaginary prior art. That is not the intent of §103. We will not use appellants' claim preamble as prior art against them in this situation.

centrations of between 22 to 53%," but nowhere argues that this suggests appellants' claimed volume loadings. Like the board and the examiner, we find this fact to be of little significance in light of the references considered in their entireties.

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ratios of between 22 to 53%," but nowhere does this suggest appellants' claimed metal loadings. Like the board and the examiner, we find this fact to be of little significance in light of the references considered in their entirety.

Thus, we are directed to no combination of prior art references which would have rendered the claimed subject matter as a whole obvious to one of ordinary skill in the art at the time the invention was made. The PTO has not shown the existence of all of the claimed limitations in the prior art or any suggestion leading to their combination in the manner claimed by appellants.

The remainder of the rejections concerning claim groups II and III, relying as they do on the erroneous combination set forth above, are likewise in error. In view of the foregoing, the rejections of claims 1-45 as obvious under 35 USC 103 are reversed.

Reversed.

Baldwin, Judge, concurring.

I am in full agreement with the result reached in the majority opinion.

I must strongly disagree with the suggestion that rejections under the second paragraph of §112 are somehow limited only to a consideration of whether or not the claims are vague. Extrinsic evidence will sometimes prove that an applicant is not "claiming the subject matter which [he] \* \* \* regards as his invention." In re Prater, 56 CCPA 1381, 415 F.2d 1393, 162 USPQ 541 (1969).

This court has specifically countenanced such rejections:

If the scope of subject matter embraced by a claim is clear, and if the applicant has not otherwise indicated that he intends the claim to be of a different scope, then the claim does particularly point out and distinctly claim the subject matter which the applicant regards as his invention. [Emphasis ours.]

In re Borkowski, 57 CCPA 946, 952, 422 F.2d 904, 909, 164 USPQ 642, 645-646 (1970).

An assessment of all of the evidence in this case leads me to the conclusion that appellants are claiming their invention. The examiner argued that the lack of a lower limit to the pigment size in the claims "made the claims readable on fine particles" and since the specification states "that the instant invention lies in the use of coarse particles," appellants do not claim the subject matter they regard as their invention. I disagree.

Each of the independent claims requires that the composition be an "electromagnetic energy shield." The specification reveals that a composition in which the metal particles have insulating films of, e.g., the

plastic matrix, does not operate as "electromagnetic energy shield." The specification further states that the finely-divided pigment particles in the prior art composition will have "insulating layers of resin \* \* \* between the contiguous particles." Accordingly, the claims do not include subject matter outside the scope of appellants' view of their own invention in spite of absence of the lower limit. See In re Mayhew, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976) (concurring opinion).

## Court of Customs and Patent Appeals

Almasi, et al.

v. Strauss

No. 78-566

Decided Jan. 11, 1979

## PATENTS

### 1. Construction of specification and claims — Interference counts — In general (§22.501)

Materiality in proposed counts of portions omitted from claims must be determined solely by analysis of whether such portions defined material aspects of patentee's invention, in determining propriety of claims copied from patent.

#### Particular patents — Domain Detector

3,691,540, Almasi, Chang, Keefe, and Thompson, Integrated Magneto-Resistive Sensing of Bubble Domains, denial of priority against Strauss, reissue application, reversed.

Appeal from Patent and Trademark Office Board of Patent Interferences.

Patent interference No. 98,920 between George S. Almasi, Hsu Chang, George E. Keefe, and David A. Thompson, Patent No. 3,691,540, issued Sept. 12, 1972, and Walter Strauss, reissue application, Serial No. 341,490, filed Mar. 15, 1973, to reissue Patent No. 3,609,720 issued Sept. 28, 1971. From decision awarding priority to party Strauss, party Almasi appeals. Reversed.

Clyde C. Metzger, and Pennie & Edmonds, both of New York, N.Y., for appellants.

Peter V. D. Wilde, Murray Hill, N.J., for appellee.

particularly concerned with the order in which the prior-art references were cited by the PTO. In re Bush, 49 CCPA 752, 296 F.2d 491, 131 USPQ 263 (1961).

[2] Appellants properly contend that the discovery of a hitherto unknown and unexpected property possessed by the claimed compound would be evidence of its unobviousness. In re Albrecht, 514 F.2d 1389, 185 USPQ 585 (CCPA 1975). In view of the Anderson patent, however, it is not at all clear that antiviral activity in either the claimed compound or its prior-art analog, disclosed as an antitubercular agent, would have been unexpected. Anderson's disclosed groups of dibenzofurans and dibenzothiophenes, all possessing antiviral activity, are so diverse that the claimed compound cannot be said to be any further removed from the diacetyl compounds actually disclosed than are the compounds of any other disclosed group. From the teachings of Anderson on this point, antiviral activity would appear to be an attribute of acetyl-substituted dibenzofuran and dibenzothiophene nuclei, no evidence of a significant degree of unpredictability in this area having been adduced. Compare In re Wilder, 563 F.2d 457, 195 USPQ 426 (CCPA 1977) (no unpredictability found) with In re May, F.2d , 197 USPQ 601 (CCPA 1978) (unpredictability found).

We conclude that the PTO has established a prima facie case of obviousness under § 103 which appellants have failed to rebut by persuasive evidence.

The decision of the board is affirmed.  
Affirmed

### Court of Customs and Patent Appeals

In re Oelrich and Divigard

No. 78-502 Decided June 15, 1978

### PATENTS

#### 1. Court of Customs and Patent Appeals — Issues determined — Ex parte cases (§28.203)

Court of Customs and Patent Appeals would be more inclined to reach issue, under In re Pearson, 181 USPQ 641, rationale, of whether claim is anticipated by patent from which it is allegedly obvious

under 35 U.S.C. 103, if that issue, which would be determined de novo, did not turn on facts not of record.

#### 2. Patentability — Invention — In general (§51.501)

##### Pleading and practice in Patent Office — Rejections (§54.7)

Patent and Trademark Office must show that claimed subject matter would have been obvious to one of ordinary skill in art at time invention was made for patentability to be negated under Section 103; this entails determination of scope and content of prior art, differences between claimed invention and prior art, and level of ordinary skill in art; in so doing, Office usually must evaluate both scope and content of prior art and level of ordinary skill solely on cold words of literature; one or both of these factual inquiries can become distorted when only literature is relied upon.

#### 3. Patentability — Anticipation — Publications — In general (§51.227)

Speculative statements appearing in prior art literature are good for purposes of rejection under Section 103 for all that they would fairly suggest to one of ordinary skill in art.

#### 4. Evidence — Expert testimony (§36.10)

##### Patentability — Evidence — In general (§51.451)

##### Patentability — Tests of — Skill of art (§51.707)

Showings of fact are much preferred to statements of opinion; nature of establishment of obviousness of claimed matter and strength of opposing evidence must be taken into consideration in assessing probative value of expert opinion that was introduced on issue of level of ordinary skill, which is usually determined by reference to subjective reaction of persons so skilled, and is opposed by fragile prima facie case of obviousness.

#### 5. Patentability — Invention — In general (§51.501)

Question under Section 103 is not whether one skilled in art doing what patent applicants did would have discovered what they discovered, but whether it would have been obvious to one of ordinary skill in art to do what they did.

under 35 U.S.C. 103, if that issue, which would be determined de novo, did not turn on facts not of record.

## 1. Patentability — Invention — In general (§51.501)

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Showings of fact are much preferred to statements of opinion; nature of establishment of obviousness of claimed matter and length of opposing evidence must be taken into consideration in assessing probative value of expert opinion that was induced on issue of level of ordinary skill, which is usually determined by reference to subjective reaction of persons so skilled, and is opposed by fragile prima facie case of obviousness.

### Patentability — Invention — In general (§51.501)

Question under Section 103 is not whether one skilled in art doing what patent applicants did would have discovered it they discovered, but whether it would have been obvious to one of ordinary skill in art to do what they did.

## Particular patents — Control Mechanism

Oelrich and Divigard, Sub-Critical Time Modulated Control Mechanism, rejection of claims 1-5 reversed.

Appeal from Patent and Trademark Office Board of Appeals.

Application for patent of John A. Oelrich and Albert J. Divigard, Serial No. 452,050, filed Mar. 18, 1974. From decision rejecting claims 1-5, applicants appeal. Reversed.

Roger A. Van Kirk, and Fishman & Van Kirk, both of East Hartford, Conn., for appellants.

Joseph F. Nakamura (Thomas E. Lynch, of counsel) for Commissioner of Patents and Trademarks.

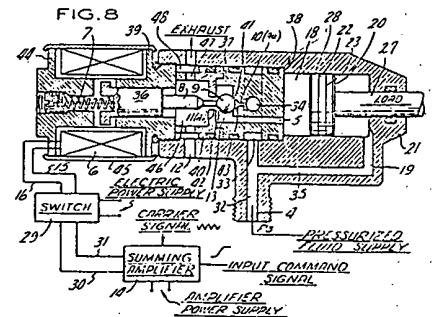
Before Markey, Chief Judge, and Rich, Baldwin, Lane, and Miller, Associate Judges.

Rich, Judge.

This appeal is from the decision of the Patent and Trademark Office (PTO) Board of Appeals (board) affirming the rejection of claims 1-5 in appellants' application serial No. 452,050, filed March 18, 1974, for "Sub-Critical Time Modulated Control Mechanism," under 35 USC 103 as obvious from U.S. Patent No. 3,430,536 for "Time Modulated Pneumatically Actuated Control Mechanism," issued March 4, 1969, to John A. Oelrich, one of the present joint applicants. We reverse.

The invention relates generally to control mechanisms used, inter alia, to move steering fins on guided missiles. The device responds to an electrical signal from the missile guidance system, variously described as the "command," "input," or "error" signal, the magnitude of which is proportional to the desired amount of course-correcting fin movement, and converts this signal into a pneumatic pressure of appropriate magnitude which acts on a piston to move the fin. Before describing the particulars of the claimed invention, we will briefly describe the prior art control devices cited by the PTO which appellants concede to have been the starting point of their invention.

An exemplary embodiment of the prior art actuator described in the Oelrich patent is illustrated below:



Cyclic energization of solenoid 6 by a periodic carrier signal (illustrated) alternately pressurizes and exhausts piston working area 18. The cycle is so fast that time delays resulting from the size of inlet port 10(Au) and exhaust port 11(Ad) cause a steady-state pressure to be approximated in area 18 which is balanced by constant pressure on piston surface 20 when the control is in the neutral or "null" position. When a command signal (illustrated) is superimposed on the carrier signal in summing amplifier 14, switch 29 responds to the altered signal to alter the relative durations of solenoid energization and solenoid de-energization within each cycle.

For example, a command signal increasing the magnitude of the signal which reaches switch 29 will cause the solenoid to be energized for a greater portion of each cycle than it is de-energized. Accordingly, pressurization time is greater than exhaust time, the approximate steady-state pressure in area 18 is increased, and piston 28 moves to the right, thereby moving the steering fin (not shown). If the command signal decreases the magnitude of the signal reaching switch 29, the solenoid will be de-energized for a greater portion of each cycle than it is energized, exhaust time will be greater than pressurization time, the steady-state pressure in area 18 is reduced, and piston 28 moves to the left. Such operation of the actuator is said to be "time modulated."

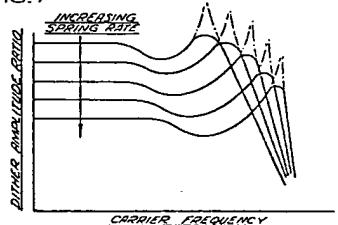
At any given time, the pressure in area 18 will fluctuate somewhat in accordance with the frequency of the bursts of pressurized gas received therein, which, in turn, depends on the carrier signal frequency. These pressure variations cause slight load (fin) movements attributable to the carrier signal rather than the command signal, and such movement is termed "dither." Some dither is desirable in overcoming friction, often termed "coulomb friction," which might otherwise cause the control to stick in its neutral position. Such

a desirable degree of dither is manifested as a slight vibration of the device. Excessive dither, sufficient to cause significant load (fin) movement, is obviously undesirable. The pressure fluctuations that cause dither are known to depend, inter alia, on the impedance or responsiveness of the load and the carrier signal frequency.

A second factor governing operation of the Oelrich control systems is that each such system has a natural resonant frequency, sometimes termed "critical frequency." When excited by a carrier signal at the critical frequency, system response is out of proportion to input; that is to say, uncontrolled oscillation of the steering fin occurs.

The parties seem to agree that the device disclosed in the Oelrich patent was employed only with the then available steering fins which they characterize as "high inertia" loads. According to Fig. 7 of the Oelrich patent, dither amplitude, expressed in terms of "dither amplitude ratio,"<sup>1</sup> and carrier frequency in systems employing such loads were known to be related generally as follows (increasing spring rate connotes increasing load, and resonant peaks (broken lines) are shown as moving to the right with increases):

FIG. 7



The Oelrich patent states that it is preferred to operate the control using carrier frequencies above the critical frequency in order to obtain the desired low dither amplitudes in the area where the curves converge. The control there described, however, is subsequently characterized as "adapted to receive a carrier frequency substantially in excess of the particular system critical or resonant frequency \* \* \*."

#### The Invention

With the advent of light-weight missile steering fins, it became desirable to employ the Oelrich control with low inertia loads. It was found, however, that the critical frequency of such a system was so high

<sup>1</sup> "Dither amplitude ratio" is the ratio of actuator output motion to the amplitude of the duty cycle (carrier signal).

that super-critical operation exceeded the practical capabilities of available solenoids, which are stated to have an upper frequency limit of about 175 Hz. Appellants discovered that the Oelrich control, coupled to a low inertia load, can be operated with a sub-critical carrier frequency without incurring unacceptably large dither which, they allege, would have been expected by those of ordinary skill in the art based on the known frequency-response characteristics of high inertia systems. Claims 1 and 2 are illustrative and read (emphasis ours):

1. A time modulated fluid actuated control apparatus comprising:

housing means, said housing means defining a cylinder; actuator piston means disposed in said housing means cylinder; said piston means including an output member adapted to be connected to a movable load, said load and control apparatus defining a system having a range of resonant frequencies;

solenoid operated valve means mounted on said housing means, said valve means being selectively operable to deliver pressurized fluid to and to vent fluid from said housing means cylinder at one side of said piston means;

means for generating variable input command signals commensurate with the desired position of the load, said command signals being characterized by a dynamic frequency range below said range of said resonant frequencies;

means for generating a signal at a carrier frequency, said carrier frequency being greater than the maximum dynamic command signal frequency and less than the minimum system resonant frequency;

means for modulating said carrier frequency signal by said command signals; and

means responsive to said modulated carrier frequency signal for controlling energization of said solenoid operated valve means.

2. The method for the control of a pneumatic position control mechanism employing an expansible chamber motor having an output shaft couple [sic] to a movable load, said method comprising the steps of

generating a command signal commensurate with the desired position of the movable load coupled to the control mechanism motor output shaft, the frequency of the command signals being within a range determined by the primary band width of the actuator system

super-critical operation exceeded the capabilities of available solenoids, which are stated to have an upper frequency limit of about 175 Hz. Appellant discovered that the Oelrich control, when used to a low inertia load, can be operated with a sub-critical carrier frequency without incurring unacceptably large dither which, they allege, would have been avoided by those of ordinary skill in the art based on the known frequency-response characteristics of high inertia systems. Claims 1 and 2 are illustrative and (emphasis ours):

1. A time modulated fluid actuated control apparatus comprising:  
housing means, said housing means defining a cylinder; actuator piston means disposed in said housing means; said piston means including an output member adapted to be connected to a movable load, said load and control apparatus defining a system having a range of resonant frequencies; solenoid operated valve means mounted on said housing means, said valve means being selectively operable to deliver pressurized fluid to and to return fluid from said housing means cylinder at one side of said piston means; means for generating variable input command signals commensurate with the desired position of the load, said command signals being characterized by a dynamic frequency range below the range of said resonant frequencies; means for generating a signal at a carrier frequency, said carrier frequency being greater in the maximum dynamic command signal frequency and less than the minimum system resonant frequency;  
means for modulating said carrier frequency signal by said command signals; and  
means responsive to said modulated carrier frequency signal for controlling the energization of said solenoid operated valve means.

2. The method for the control of a pneumatic position control mechanism employing an expansible chamber motor having an output shaft coupled to a movable load, said method comprising the steps of  
generating a command signal commensurate with the desired position of the movable load coupled to the control mechanism motor output shaft, the frequency of the command signals being within a range determined by the primary band width of the actuator system

including the control mechanism and the load;

generating a carrier signal at a frequency less than the minimum resonant frequency of the actuator system and greater than the maximum command signal frequency; modulating the carrier frequency signal with a command signal; and controlling the delivery of pressurized gas to the position control mechanism expansible chamber motor in accordance with the magnitude of the modulated carrier frequency signal.

The Rejection

[1] The examiner rejected claims 1-5 under 35 USC 103 as obvious from the Oelrich patent, noting the reference's specific teachings that carrier frequencies yielding "a degree of dither" were desirable and that super-critical operation was merely preferred.<sup>2</sup> The general teachings of Oelrich that carrier frequency should be selected to optimize system performance indicated to the examiner that selection of a particular carrier frequency was "a mere choice in design" and that optimization of a low-inertia system would have led to the claimed modification.

The Affidavits

In response to the examiner's rejection, four affidavits were submitted in an attempt to show that those of ordinary skill in the art would not have known from the Oelrich patent that the control system there described could be operated satisfactorily with a sub-critical carrier frequency, wherefore operation at such frequency would not have been obvious.

Co-inventors Oelrich and Divigard, conceded by the PTO to be men of ordinary skill in the art, separately aver that the claimed modification was not obvious to them. As objective evidence of his assertion that those skilled in the art, such as himself, did not believe that the Oelrich control was suitable for use with sub-critical carrier frequencies, Divigard appended to his affidavit his own published report on

<sup>2</sup> Nobody has at any time asserted that apparatus claim 1 is anticipated by Oelrich, and we choose not to consider the question de novo here on appeal. If the question did not turn on facts not of record, e.g., the nature of the Oelrich signal generator, we would be more inclined to reach the issue under the rationale of *In re Pearson*, 494 F.2d 1399, 181 USPQ 641 (CCPA 1974).

the performance of the Oelrich control which specified the use of super-critical carrier frequencies. In the same vein, an attachment to Oelrich's affidavit indicates that Oelrich and Divigard, when actually confronted with customer requests for adaptations of the Oelrich control to low-inertia systems having very high critical frequencies, did not suggest use of sub-critical carrier frequencies, suggesting, instead, that the whole system be modified to reduce the critical frequency and allow the use of a super-critical carrier frequency.

Friedman, an electrical engineering professor whose credentials as one skilled in the art are unquestioned by the PTO, avers that the use of a sub-critical carrier frequency in an Oelrich-type device would not have been obvious to him.

Kolk, also a professor of electrical engineering of unimpeached qualification as one skilled in the art, analyzes the teachings of Oelrich in detail. The above-noted distinction between desirable and undesirable degrees of dither in systems such as these is pointed out, the perceptible actuator movement associated with the latter being said to cause mechanical wear. Kolk states that one might be tempted to operate in the sub-critical "valley" in the Fig. 7 frequency-response curve except that the "valley" is too shallow to give acceptable degrees of dither, such being encountered in Fig. 7 only above the critical frequency. Even if the "valley" were deeper, super-critical-frequency operation would still have been called for, in Kolk's opinion, because of the danger of harmonics of the carrier signal (weaker signals at integral multiples of the carrier frequency) exciting the mechanical resonance or interfering with the command signal. Kolk states that the excessive power required to drive a solenoid at a super-critical frequency in a system with a high resonant frequency and the unreliability introduced by mechanical wear caused by such operation would have led him to reject the Oelrich control for use in low-inertia systems.

Kolk avers that the instantly claimed invention lies in the recognition and utilization of a deep, sub-critical "valley" in the frequency-response curve of low-inertia systems employing the Oelrich control.

The Board

The board, with one member specially concurring, affirmed the examiner's rejection noting that all of the affidavits stated that the Oelrich device should be operated



with a super-critical carrier frequency to obtain a *practical* system having a certain operational life span. Since the board felt that Oelrich teaches the use of super-critical carrier frequencies merely as "preferred," it was of the opinion that the use of a sub-critical frequency in a system where large dither could be tolerated would have been obvious. The affidavits are criticized as failing to state factual bases for the conclusion that the reference as a whole does not teach the use of sub-critical frequencies. In essence, the board's position was that sub-critical-frequency operation is broadly contemplated by Oelrich, and that the affidavits fail to establish that such operation was thought to be *not possible*.

#### *The Arguments*

Appellants contend here, as they did before the board, that one of ordinary skill in the art would not have read the Oelrich patent, as a whole, as teaching the use of sub-critical carrier frequencies. The affidavits are alleged to establish that the view prevailing among those working in the art at the time the invention was made was that Oelrich-type control mechanisms simply were not suitable for use with sub-critical carrier frequencies, e.g., in systems with very high critical frequencies.

The solicitor, in defending the board's position, has interjected yet another theory upon which he urges the rejection might be sustained. It is alleged that Oelrich, at the very least, suggests running a frequency-response analysis of any system in which use of the Oelrich control was contemplated, and, once a low-inertia system was so analyzed, conventional design criteria outlined by Kolk would have dictated operation in the deep sub-critical "valley" that would have been discovered. To this argument, appellants predictably respond by arguing that those of ordinary skill in the art would not have been motivated to run such an analysis, thinking no useful purpose would be served thereby based on their expectation that the Oelrich control was unsuitable for use with sub-critical carrier frequencies.

#### **Opinion**

[2] For patentability to be negated under §103, the PTO must show that the claimed subject matter would have been obvious to one of ordinary skill in the art at the time the invention was made. This entails a determination of the scope and con-

tent of the prior art, the differences between the claimed invention and the prior art, and the level of ordinary skill in the art. *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966). In so doing, the PTO usually must evaluate both the scope and content of the prior art and the level of ordinary skill solely on the cold words of the literature. When only the literature is relied upon, occasionally one or both of these factual inquiries becomes distorted. In *re Palmer*, 59 CCPA 733, 451 F.2d 1100, 172 USPQ 126 (1971). In our opinion, this is such a case.

The evidence of record bearing on the content of the prior art and the level of ordinary skill consists of the words of the Oelrich patent and the affidavits of four persons conceded to have been of ordinary skill in the art. If the affidavits are to be believed, then statements in the Oelrich patent implying that a sub-critical carrier frequency is feasible, albeit not "preferred," must be dismissed as speculation.

[3] Even if speculative, statements appearing in the prior-art literature are good, for purposes of rejection under §103, for all that they would fairly suggest to one of ordinary skill in the art. See *In re Wiggins*, 488 F.2d 538, 179 USPQ 421 (CCPA 1973); *In re Trbojevich*, 53 CCPA 1241, 361 F.2d 1013, 150 USPQ 50 (1966). In determining how the Oelrich disclosure was interpreted by those skilled in the art, we are more impressed by what those so skilled *did* than by what they *said*. Even though the words of the Oelrich patent implied that sub-critical operation was feasible, it was never, in fact, considered when a concrete problem requiring such operation was actually presented to two persons of ordinary skill in the art, both intimately familiar with the Oelrich patent. The actions of those skilled in the art reflected by this record indicate that the speculative statements in the Oelrich patent were recognized as such and ignored by those working in the art. The opinions of two other experts are in accord.

We believe the board's criticism of the affidavits for failing to recite factual bases for the conclusions reached is unwarranted in this case. To the extent above noted, the affidavits of Oelrich and Divigard are based on facts. The Kolk affidavit is grounded, in large part, on technically sound applications of unquestioned physical principles. To the extent that all of the affidavits express opinions, they are the opinions of men conceded to be of ordinary skill in the art based on information



the prior art, the differences between claimed invention and the prior art at the level of ordinary skill in the art. *v. John Deere Co.*, 383 U.S. 1, 148 59 (1966). In so doing, the PTO must evaluate both the scope and of the prior art and the level of skill solely on the cold words of the evidence. When only the literature is relevant, occasionally one or both of actual inquiries becomes distorted. *Almer*, 59 CCPA 733, 451 F.2d 126 USPQ 126 (1971). In our opinion, in such a case,

evidence of record bearing on the level of the prior art and the level of skill consists of the words of the patent and the affidavits of four persons conceded to have been of ordinary skill in the art. If the affidavits are to be believed, then statements in the Oelrich patent implying that a sub-critical carrier is feasible, albeit not "pre-mature" must be dismissed as speculation. When if speculative, statements appearing in the prior-art literature are for purposes of rejection under 35 U.S.C. § 103, all that they would fairly suggest is of ordinary skill in the art. See *In re* [redacted], 488 F.2d 538, 179 USPQ 421 (1973); *In re* Trbojevich, 53 CCPA 361 F.2d 1013, 150 USPQ 50 (1973). In determining how the Oelrich patent was interpreted by those skilled in the art, we are more impressed by what they did than by what they said. Though the words of the Oelrich patent implied that sub-critical operation was possible, it was never, in fact, considered a concrete problem requiring such action as was actually presented to two persons of ordinary skill in the art, both familiar with the Oelrich patent. Opinions of those skilled in the art rebuffed by this record indicate that the definitive statements in the Oelrich patent were recognized as such and ignored by those working in the art. The opinions of other experts are in accord.

We believe the board's criticism of the facts for failing to recite factual bases for conclusions reached is unwarranted in this case. To the extent above the affidavits of Oelrich and [redacted] are based on facts. The Kolk affidavits are grounded, in large part, on technical applications of unquestioned principles. To the extent that all affidavits express opinions, they are opinions of men conceded to be of ordinary skill in the art based on information

uniquely within their competence bearing on the level of ordinary skill in the art at the time the invention was made. Their conclusions are reasonable, and thus more credible, in view of the fact that only a single word ("preferred") in the entire eighteen columns of disclosure in the Oelrich patent is in any way contrary thereto.

[4] While we concur in the sentiment expressed by the board that showings of fact are much preferred to statements of opinion, we are of the view that the nature of the matter sought to be established, as well as the strength of the opposing evidence, must be taken into consideration in assessing the probative value of expert opinion. In this case, the expert opinions were introduced on the issue of the level of ordinary skill, which is usually determined by reference to the subjective reaction of persons so skilled. *In re Meng*, 492 F.2d 843, 181 USPQ 94 (CCPA 1974), and are opposed by a fragile prima facie case of obviousness. In our opinion, the affidavits were sufficient to shift the burden of going forward with the evidence back to the PTO, and that burden has not been sustained. In other words, the prima facie case of obviousness has been overcome.

[5] The solicitor correctly contends that had one conducted a frequency-response analysis on a low-inertia-load system, he would have discovered, as did appellants, that sub-critical control was feasible. The question under §103, however, is not whether one skilled in the art doing what appellants did would have discovered what appellants discovered, but whether it would have been obvious to one of ordinary skill in the art to do what appellants did. *In re Lemin*, 53 CCPA 1382, 364 F.2d 864, 150 USPQ 546 (1966). In view of the affidavits submitted, we think not.

The decision of the board is reversed.  
Reversed

## U.S. Court of Claims

General Dynamics Corporation  
v. The United States

No. 21-76 Decided July 8, 1977

### PATENTS

#### 1. Court of Claims — Jurisdiction (§27.5)

##### Court of Claims — Pleading and practice (§27.7)

##### Title — Contracts — In general (§66.201)

Government attorney who litigated before Armed Services Board of Contract Appeals without objecting to forum, implicitly agreed to modification that cured defect in parties' contract, whose Patent Rights clause did not specify availability of such specific administrative relief as to bring licensing controversy developing out of that clause within board's mandatory jurisdiction, vesting board with necessary authority to hear and decide licensing dispute with all finality of Wunderlich Act as interpreted in *S & E Contractors, Inc. v. U.S.*, 406 U.S. 1; contract modification affirming board's authority to pass on parties' licensing dispute is to be enforced in Court of Claims action against U.S. for patent infringement in that facts found by board are binding on Government within Supreme Court's rulings in *U.S. v. Utah Construction & Mining Co.*, 384 U.S. 394, and *S & E Contractors, Inc. v. U.S.*, 406 U.S. 1.

#### 2. Court of Claims — Pleading and practice (§27.7)

Party alleging infringement can properly accept Armed Services Board of Contract Appeals' fact-finding on license issue and still ask for trial to take additional evidence on validity dispute.

#### 3. Court of Claims — Jurisdiction (§27.5)

Court of Claims has exclusive jurisdiction over patent infringement claims brought against Government, but that vesting of jurisdiction is no more exclusive than that granted court over contract claims in excess of \$10,000.

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